

BREAKING THE VICIOUS CYCLE OF PATENT DAMAGES

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Patent law is implicitly, and sometimes explicitly, based upon a story of patent infringement in which technology users are presumed to be able to discover relevant patents in advance and either design around them or negotiate patent licenses before using the patented technology. That story does not hold true in many fields today, in which the number and widespread ownership of potentially relevant patents renders such preclearance both infeasible as a practical matter and undesirable as a matter of economic policy. But patent damages law continues to apply this outmoded paradigm. As a result, current doctrine perpetuates a vicious cycle of excessive, socially harmful remedies.

We propose a number of ways for patent law to adapt to this new reality. First, reasonable royalty remedies should be based on the market value of the patent before infringement and should exclude post-infringement considerations such as lock-in that infect current doctrine and lead to exaggerated damages awards. Second, patent remedy law should distinguish between infringers in the paradigmatic story, who can be regarded as guilty infringers, and innocent infringers for whom preclearance was not practicable; and it should further distinguish between patent holders that were willing to license their patents before infringement and those that had decided to retain exclusive control over their patented invention. In effect, there are four combinations: innocent/willing, innocent/unwilling, guilty/willing, and guilty/unwilling. Remedies should depend on which combination is at issue, and injunctions should be available only for unwilling licensors. In the innocent/unwilling scenario, the patent holder should be able to obtain an injunction only if it agrees to bear the innocent infringer's costs of switching to a noninfringing alternative.

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INTRODUCTION

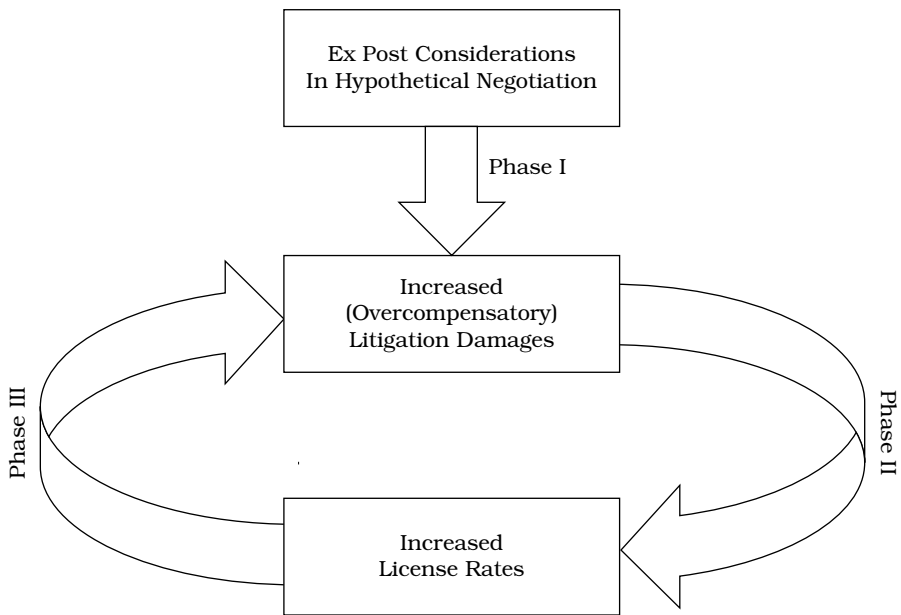
Patent law is intended to foster the creation and distribution of new and valuable inventions. To further that objective, patent remedies must balance three competing incentives: first, patentees' incentive to invent; second, other firms' incentive to develop new products and to innovate, sometimes building upon the inventions of others; and third, the incentive for patent holders and firms interested in using technology claimed by their patents ("technology users") to negotiate patent licenses "ex ante" (i.e., prior to any patent infringement) where it is economically efficient for them to do so. Undercompensating patent holders gives them inadequate incentives to invent, while overcompensating patent holders unnecessarily deters innovation by other firms.

Current patent remedies do not adequately reflect these competing incentives in light of current market circumstances and thus, unsurprisingly, produce suboptimal results. Patent damages law is implicitly based upon a "paradigmatic story" of patent infringement in which technology users are presumed to be able to discover relevant patents in advance and then either negotiate a patent license ex ante or choose a noninfringing alternative. In this story, infringers are wrongdoers: infringe-

ment occurs only when the infringer either fails to discover relevant patents or misappropriates the ideas in patents they do find.

However, in many fields today—including key high-tech fields like information technology (IT)—this paradigmatic story does not apply. A profusion of overlapping and unclear patent rights in these fields make full patent preclearance—i.e., avoiding infringement by obtaining in advance licenses to all relevant patents—literally impossible in many situations and, in others, so costly that it is not feasible as a practical matter. The law has failed to adapt to this new reality. Flaws in current doctrine create a reinforcing cycle that perpetuates inflated patent damages and imposes a wasteful drag on commercial development and innovation, and an inefficient tax (in the form of higher prices) on the public.

FIGURE 1



As seen in the figure above, this cycle has three phases:

- Phase One:** Flawed reasonable royalty doctrine creates litigation damages that overcompensate patent holders by taking into account ex post considerations—i.e., developments after the infringement began, such as the infringer's costs of switching to a different technology—that are not tied to the actual benefit conferred by the patented technology.

- **Phase Two:** Higher litigation damages result in higher negotiated license fees because license negotiations generally occur in the shadow of litigation. The more a patent holder can obtain from litigation, the more an infringer has to pay the patent holder to forego litigation.
- **Phase Three:** Higher license fees feed back into litigation damages. Fees in negotiated licenses are a key factor in computing reasonable royalty damages. Thus, when those fees are inflated, the vicious cycle is perpetuated further.

The feedback loop is especially powerful in sectors such as IT, where patent preclearance is particularly difficult because of patent thickets and related economic factors. As a result, technology users often are not able to address specific instances of patent infringement until after their products have been developed and launched and they are already committed—“locked in”—to using the infringing technology. This lock-in increases the fees a patent holder can obtain in negotiation from technology users and the damages the patent holder can obtain in litigation. Those two effects reinforce one another.

We propose a number of ways to break this vicious cycle. First, reasonable royalty patent damages should be based on the ex ante value of the patent and should exclude any ex post considerations such as lock-in costs. Second, damages law should be structured to incentivize economically efficient choices. When it is impractical to identify every potentially relevant patent and to negotiate a license ex ante, infringers should not be penalized (by consideration of ex post evidence) for proceeding with product development. By contrast, when a company can cost-effectively learn of relevant patents and avoid infringement ex ante, it should be deterred from proceeding to infringe the patents. As we will explain, such deterrence can be achieved better through enhanced damages than through the injection of ex post considerations into the damage calculation.

Our recommendations are summarized in the following table, which uses nomenclature that is explained below:

TABLE 1

Remedies for Patent Infringement

	Ex ante willing licensor	Ex ante unwilling licensor
"Innocent" Infringer	Past damages: Reasonable royalty based on strictly ex ante hypothetical negotiation.	Past damages: Lost profits will usually be available. Otherwise, a reasonable royalty based on strictly ex ante hypothetical negotiation.
	Prospective Relief: Ongoing royalty at same rate as past damages. No injunction.	Prospective Relief: Patent holder chooses between: (1) ongoing royalty at same rate as past damages ("Rule Two"); or (2) injunction, but patent holder has to pay infringer's cost to switch to a noninfringing alternative ("Rule Four").
"Guilty" Infringer	Past damages: <u>Compensatory:</u> Lost profits if proven; otherwise reasonable royalty based on strictly ex ante hypothetical negotiation; plus <u>Deterrence:</u> Enhanced damages evaluated as of lock-in date.	Past damages: <u>Compensatory:</u> Lost profits will usually be available; otherwise, a reasonable royalty based on strictly ex ante hypothetical negotiation; plus <u>Deterrence:</u> Enhanced damages evaluated as of lock-in date.
	Prospective Relief: Ongoing royalty at same rate as past compensatory damages. No injunction.	Prospective Relief: Injunction unless against public interest or changed circumstances make it inadvisable. If no injunction, ongoing royalty at same rate as past compensatory damages.

I

BACKGROUND—HOW DAMAGES LAW GOT TO WHERE IT IS

Patent law is built on a fundamental principle that providing inventors with certain exclusive rights to their inventions will incentivize the creation and dissemination of valuable innovations.¹ As the Supreme Court has long recognized, "the

¹ The instrumental purpose of patent law is stated explicitly in the U.S. Constitution, which empowers Congress "to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive

limited and temporary monopoly granted to inventors was never designed for their exclusive profit or advantage; the benefit to the public or community at large was another and doubtless the primary object in granting and securing that monopoly.”²

There is little dispute that providing inadequate patent protection to inventors would leave them without optimal incentives to invent.³ There is also little dispute that the ultimate goal of fostering innovation would be undermined by providing too great a degree of protection to patents and, in particular, that excessive damages for patent infringement would reduce the overall incentive for firms to develop commercial products and to innovate by building on earlier inventions.⁴

The assessment of damages for patent infringement is therefore of central importance to Congress’s overall scheme to foster innovation. To that end, the Patent Act states: “A patentee shall have remedy by civil action for infringement of his patent.”⁵ That remedy could be the grant of an injunction “in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court

Right to their respective Writings and Discoveries.” U.S. CONST. art. I, § 8, cl. 8; cf. ROGER D. BLAIR & THOMAS F. COTTER, *INTELLECTUAL PROPERTY: ECONOMIC AND LEGAL DIMENSIONS OF RIGHTS AND REMEDIES* 42 (2005) (“[T]he standard justification for patents and copyrights is that they provide a necessary incentive to create, disseminate, and commercialize inventions and works of authorship.”).

² *Kendall v. Winsor*, 62 U.S. 322, 327–28 (1858); see also *Quanta Comput., Inc. v. LG Elecs., Inc.*, 553 U.S. 617, 626 (2008) (noting that “the primary purpose of our patent laws is not the creation of private fortunes for the owners of patents but is ‘to promote the progress of science and useful arts’” (quoting *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 511 (1917))).

³ See, e.g., FED. TRADE COMM’N, *THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION* 40 (2011) (“[A] patent enables [the owner] to capture returns from R&D investment by preventing others from appropriating the invention and driving down prices through infringing competition.”); WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 13 (2003) (“[A] firm is less likely to expend resources on developing a new product if competing firms that have not borne the expense of development can duplicate the product and produce it at the same marginal cost as the innovator; competition will drive price down to marginal cost and the sunk costs of invention will not be recouped.”).

⁴ See, e.g., Thomas F. Cotter, *An Economic Analysis of Enhanced Damages and Attorney’s Fees for Willful Patent Infringement*, 14 FED. CIR. B.J. 291, 313–14 (2004) (“[S]upracompensatory awards could. . . induce firms to . . . avoid marketing innovative products, or (in the antitrust context) from agreeing to unconventional, but socially desirable, methods for joint production and distribution of goods.” (footnotes omitted)); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007) (excessive royalties “act as a tax on new products incorporating the patented technology, thereby impeding rather than promoting innovation”).

⁵ 35 U.S.C. § 281 (2012).

deems reasonable,”⁶ or “damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer.”⁷ Where willful infringement is found, courts have the discretion to award enhanced damages, up to three times the compensatory damages award.⁸

There is a virtual consensus among scholars that the optimum reasonable royalty remedy—in light of both incentives needed to invent and those needed to develop commercial products and to innovate further upon earlier inventions—is one that most closely restores the parties to the position they would have been in had they been able to negotiate a patent license before infringement (i.e., *ex ante*).⁹ At that time, the would-be licensee would have been willing to pay for a license no more than the incremental value of the patent over the next-best alternative, in light of the intended uses of the patented technology and the anticipated profits therefrom. The next-best alternative might be a noninfringing technology with comparable functionality or a very different alternative. If the patent holder had insisted on more than that amount, the would-be licensee would have walked away from the deal.¹⁰ We refer to the amount that the patent holder and the would-be licensee would have agreed upon *ex ante* as the patent’s “market value.”

A reasonable royalty remedy equal to the market value of the patent would best serve the patent laws’ purposes. It would

⁶ *Id.* § 283.

⁷ *Id.* § 284.

⁸ *Id.*

⁹ See FED. TRADE COMM’N, *supra* note 3, at 186; John C. Jarosz & Michael J. Chapman, *The Hypothetical Negotiation and Reasonable Royalty Damages: The Tail Wagging the Dog*, 16 STAN. TECH. L. REV. 769, 813 & n.204 (2013) (collecting authorities); Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2143 (2013). But see Ted Sichelman, *Purging Patent Law of “Private Law” Remedies*, 92 TEX. L. REV. 517, 522–25 (2014) (arguing that status quo ante remedies may underincentivize certain socially valuable inventions, such as drugs for rare diseases, and may overincentivize marginally valuable inventions, such as minor components of complex products).

¹⁰ The difference in value between the patented technology and the next-best alternative is the maximum amount on which the parties would have agreed. In many circumstances, depending on the relative bargaining power of the parties, the agreed-upon royalty would be less than that. If, for example, the would-be licensee has an alternative to the patented technology that is worth \$50 less and the patent holder has no way to replace that licensee’s royalties, both the would-be licensee and the patent holder stand to lose up to \$50 if they fail to reach an agreement and the would-be licensee chooses the noninfringing alternative. In that event, the parties would be likely to agree to split the gains from trade, and thus on a royalty of less than \$50, even assuming that there is no uncertainty about validity or infringement.

be equal to the amount to which the patent holder would have agreed if the parties had been able to reach the idealized *ex ante* preclearance agreement; requiring the patent holder to pay more than that would require it to pay more than the value of the patented technology and would indirectly impose costs on third parties by taxing and thus reducing exploitation of the patent and innovation built upon it; and paying the patent holder more than the market value of the patent would create perverse incentives for patenting inventions that cost users more than they are worth.

The principle that patent damages should be based on the amount that would have been agreed to in *ex ante* bargaining is deeply embedded in patent law and is manifest in requirements that, in most cases, courts should attempt either to compensate the patent holder for the profits it lost as a result of the infringement or to assess the “reasonable royalty” that the parties would have agreed to in a “hypothetical negotiation” for a patent license prior to infringement.¹¹ Notably, if the parties would have reached a license agreement before the infringement began, the patent holder’s lost profits would be equal to the reasonable royalty to which it would have agreed.¹²

It turns out, however, that many of the doctrines that have developed to implement these principles, often in cases similar to the “paradigmatic story” in which the infringer could have sought a license *ex ante* but did not do so, undermine the purposes of patent law when they are applied in the increasingly common case in which obtaining a license before infringement is not feasible.¹³ In particular, much of the current “reasonable royalty” doctrine allows for consideration of factors that arose only after the infringement began (i.e., *ex post*) and that have little or nothing to do with the kind of agreement the parties would have reached had they been able to negotiate a license *ex ante*.¹⁴

A. Remedies for Past Infringement

Where a party is found to have infringed a patent through past acts, compensation focuses on putting the patent holder

¹¹ See *infra* subpart III.A.

¹² While the Federal Circuit has held that the hypothetical *ex ante* negotiation is not the exclusive method of assessing a reasonable royalty, it is by far the most prevalent. See *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324–25 (Fed. Cir. 2009) (noting that the hypothetical negotiation approach is not the sole method for estimating a reasonable royalty, merely a “common” one).

¹³ See *infra* Part II.

¹⁴ See *infra* Part III.

in the position it would have been in had its patent rights not been infringed.¹⁵

1. *Lost Profits/Actual Damages*

If a patent holder can show that it lost a quantifiable amount of profit as a result of the infringement, its damages can be computed in a relatively straightforward manner. These lost profits—that is, how much more the patent holder would have made if there had been no infringement—will generally be the measure of “damages adequate to compensate for the infringement.”¹⁶

But there is a high bar for proving lost profits: “To obtain as damages the profits on sales he would have made absent the infringement, i.e., the sales made by the infringer, a patent owner must prove: (1) demand for the patented product, (2) absence of acceptable noninfringing substitutes, (3) his manufacturing and marketing capability to exploit the demand, and (4) the amount of the profit he would have made.”¹⁷ If even one of these elements is not established, lost profits are not available.¹⁸

In practice, these factors are rarely satisfied unless the patent owner and infringer actively compete in the same market.¹⁹ Thus, lost profits are not available in a majority of cases.²⁰

¹⁵ See *Carborundum Co. v. Molten Metal Equip. Innovations, Inc.*, 72 F.3d 872, 881 (Fed. Cir. 1995) (“The primary purpose of compensatory damages is to return the patent owner to the financial position he would have occupied but for the infringement.”).

¹⁶ 35 U.S.C. § 284 (2012).

¹⁷ *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978); see also *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 883 F.2d 1573, 1577 (Fed. Cir. 1989) (adopting *Panduit* test).

¹⁸ If these factors are satisfied, then a wide variety of losses may count as lost profits, such as losses attributable to lost sales, lowered prices, and/or lost collateral sales. 7 DONALD S. CHISUM, CHISUM ON PATENTS § 20.03 (2014).

¹⁹ See *State Indus.*, 883 F.2d at 1578 (“In the two-supplier market, it is reasonable to assume, provided the patent owner has the manufacturing and marketing capabilities, that it would have made the infringer’s sales. In these instances, the *Panduit* test is usually straightforward and dispositive.” (citation omitted)); Lemley & Shapiro, *supra* note 4, at 2017 (“Lost profits are difficult to prove, and any patent owner who does not sell goods in competition with the defendant will be unable to demonstrate lost profits from infringement.” (footnote omitted)).

²⁰ See *2014 Patent Litigation Study*, PRICEWATERHOUSECOOPERS 9, 10 chart 5 (July 2014), http://www.pwc.com/en_US/us/forensic-services/publications/as-sets/2014-patent-litigation-study.pdf [<http://perma.cc/NJG5-M7BV>] (finding that from 2010 to 2013, courts awarded lost profits in 37% of patent infringement cases).

If the patent holder has a practice of licensing its invention, the measure of actual damages is the royalty for which it would have licensed the patent to the infringer, i.e., the established royalty rate.²¹ It must, however, be a uniform rate freely negotiated and paid by a sufficient number of licensees; infrequent agreements and licenses negotiated in settlement of threatened or actual litigation are generally insufficient to show an established royalty.²² This high standard is rarely met in practice.²³

2. “Reasonable Royalty” Damages

When actual damages cannot be determined, the Patent Act instructs courts to award “in no event less than a reasonable royalty for the use made of the invention by the infringer.”²⁴ The purpose of this “reasonable royalty,” as the Sixth Circuit explained in the seminal case of *U.S. Frumentum Co. v. Lauhoff*, is to ensure that a patent holder “is not compelled to go away with nominal damages just because he cannot show that his property, or other like it, was commonly bought and sold on the market.”²⁵

Current thinking about reasonable royalty damages often begins with the Southern District of New York’s 1970 decision in *Georgia-Pacific Corp. v. United States Plywood Corp.*²⁶ The long-running case involved knowing infringement of a patent that was essential to the infringer’s product and whose commercial value had been established before the infringement.²⁷ The patent holder had a policy of not licensing anyone in the United States other than its suppliers.²⁸ In the parlance we

²¹ See, e.g., *Seymour v. McCormick*, 57 U.S. (16 How.) 480, 490 (1853) (“Where an inventor finds it profitable to exercise his monopoly by selling licenses to make or use his improvement, he has himself fixed the average of his actual damage, when his invention has been used without his license.”).

²² See *Rude v. Westcott*, 130 U.S. 152, 165 (1889); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1078–79 (Fed. Cir. 1983). For example, if a patent holder promised to limit the number of licensees or agreed to a certain number of licenses at preferential rates (e.g., to early adopters), prior licenses may not demonstrate an “established royalty.” See, e.g., *Trs. of Columbia Univ. v. Roche Diagnostics GmbH*, 272 F. Supp. 2d 90, 119 (D. Mass. 2002); *Tights, Inc. v. Kayser-Roth Corp.*, 442 F. Supp. 159, 165 (M.D.N.C. 1977).

²³ See *Mobil Oil Corp. v. Amoco Chems. Corp.*, 915 F. Supp. 1333, 1342 (D. Del. 1994) (“Because of these stringent criteria, few courts have actually found an established royalty.”).

²⁴ 35 U.S.C. § 284 (2012).

²⁵ 216 F. 610, 616 (6th Cir. 1914).

²⁶ 318 F. Supp. 1116 (S.D.N.Y. 1970).

²⁷ *Id.* at 1123, 1134.

²⁸ *Id.* at 1123.

develop in Part IV below, the case involved a “guilty” infringer and an unwilling licensor.

In its opinion, the district court surveyed the case law and set forth the now-famous list of fifteen factors that courts had previously considered in determining a reasonable royalty:

1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.
3. The nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold.
4. The licensor’s established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.
5. The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promotor.
6. The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.
7. The duration of the patent and the term of the license.
8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.
10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
11. The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.
12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented

elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.

14. The opinion testimony of qualified experts.

15. The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement²⁹

Although the hypothetical ex ante bargain was only one of the listed factors (Factor 15), the court focused on it as the guiding framework for its analysis, and treated the first fourteen factors largely as elements to be considered in aid of assessing the hypothetical negotiation.³⁰

On appeal, the Second Circuit endorsed the use of the hypothetical negotiation in general as well as the specific list of enumerated factors.³¹ However, the Second Circuit lowered the royalty set by the district court, finding error in the court's failure to recognize that a willing licensee would not agree to pay more in royalties than its anticipated profits.³² In effect, the court held that a reasonable royalty cannot exceed the amount a willing licensee would have agreed to pay ex ante.

The *Georgia-Pacific* decisions did not have an immediate impact on how courts assessed reasonable royalties, but they rose in prominence after the creation of the Federal Circuit in 1982. Initially, the Federal Circuit treated the *Georgia-Pacific* factors as only one way to approach what was essentially a totality-of-the-circumstances calculation.³³ But over the next two decades, the court began treating the *Georgia-Pacific* factors as the preferred way to compute a reasonable royalty.³⁴

More recent Federal Circuit cases indicate a decline in the primacy of the *Georgia-Pacific* factors. In a 2010 decision, the

²⁹ *Id.* at 1120.

³⁰ *See id.* at 1121–43.

³¹ *Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers Inc.*, 446 F.2d 295, 296–97 (2d Cir. 1971).

³² *Id.* at 299.

³³ *See, e.g., TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 899 (Fed. Cir. 1986) (holding that using an analytical approach rather than a hypothetical negotiation is not error because the law “does not mandate how the district court must compute that figure, only that the figure compensate for the infringement”).

³⁴ *Dow Chem. Co. v. Mee Indus., Inc.*, 341 F.3d 1370, 1382 (Fed. Cir. 2003); *Unisplay, S.A. v. Am. Elec. Sign Co.*, 69 F.3d 512, 517 n.7 (Fed. Cir. 1995); *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1555 (Fed. Cir. 1995) (en banc). The high-water mark for the influence of the *Georgia-Pacific* factors appears to be *Parental Guide of Texas, Inc. v. Thomson, Inc.*, where the Federal Circuit ruled that the disputed contract term “Litigation Royalt[ies]” meant reasonable royalties under 35 U.S.C. § 284, and that these in turn were to be determined by using the *Georgia-Pacific* factors. 446 F.3d 1265, 1270 (Fed. Cir. 2006).

court reaffirmed the hypothetical ex ante negotiation benchmark but criticized the *Georgia-Pacific* court's list of evidentiary factors for calculating the royalty as "unprioritized and often overlapping."³⁵ The court emphasized that a reasonable royalty should be based on the value of the "claimed invention," not on the value of the "platform" of which it is a part.³⁶

In a 2012 decision, the court reaffirmed that the *Georgia-Pacific* approach is not the exclusive means for calculating reasonable royalties.³⁷ And in 2014, the court held that any method for determining a reasonable royalty must be tailored to the relevant facts of the case.³⁸

Today, reasonable royalty awards are the norm, not the exception. Between 2010 and 2013, for instance, courts awarded reasonable royalties more than twice as often as lost profits.³⁹ This is not surprising, given the exacting legal standards for proving lost profits or an established royalty.⁴⁰ Also, an increasing number of suits are brought by nonpracticing entities that cannot claim lost profits because they do not make or sell any products or services.⁴¹

B. Remedies for Future Infringement

Patent holders whose patents have been infringed may seek, in addition to damages for past infringement, injunctions against future infringement or an award of ongoing royalties.⁴²

³⁵ *ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860, 869 (Fed. Cir. 2010).

³⁶ *Id.* (quoting *Riles v. Shell Expl. & Prod. Co.*, 298 F.3d 1302, 1312 (Fed. Cir. 2002)).

³⁷ *Energy Transp. Grp., Inc. v. William Demant Holding A/S*, 697 F.3d 1342, 1357 (Fed. Cir. 2012) ("Once again, this court does not endorse *Georgia-Pacific* as setting forth a test for royalty calculations, but only as a list of admissible factors informing a reliable economic analysis.").

³⁸ *See Ericsson, Inc. v. D-Link Sys.*, 773 F.3d 1201, 1230–31 (Fed. Cir. 2014) (finding reversible error where the district court instructed the jury on *Georgia-Pacific* factors not applicable to the case at hand).

³⁹ PRICEWATERHOUSECOOPERS, *supra* note 20, at 10 chart 5. Reasonable royalties were awarded in 81% of the cases. *Id.* Lost profits were awarded in 37% of cases and price erosion in 1% of cases. *Id.* Because these data include cases in which the award included a combination of reasonable royalties and other damages, the total exceeds 100%. *Id.* at 9 n.3.

⁴⁰ *See supra* notes 16–22 and accompanying text.

⁴¹ *Litigations Over Time*, PATENTFREEDOM (2014), <https://www.patentfreedom.com/about-npes/litigations/> [<https://perma.cc/5M2K-M9SS>].

⁴² 35 U.S.C. § 283 (2012); *Paice LLC v. Toyota Motor Corp.*, 504 F.3d 1293, 1313–16 (Fed. Cir. 2007).

1. *Injunctions*

In the modern era of patent litigation, permanent injunctions against adjudged infringers came to be “the norm.”⁴³ In 2006, however, the Supreme Court in *eBay Inc. v. MercExchange, L.L.C.* rejected the practice that injunctions “automatically follow[]” infringement determinations.⁴⁴ The Court held that “well-established principles of equity” should control and that “a plaintiff seeking a permanent injunction must satisfy a four-factor test,” namely that:

1. it has suffered an irreparable injury;
2. remedies available at law, such as monetary damages, are inadequate to compensate for that injury;
3. considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and
4. the public interest would not be disserved by a permanent injunction.⁴⁵

Although the Supreme Court offered little in the way of practical guidance as to how courts should apply the enumerated factors, recent empirical analyses indicate that courts are now far less likely to award injunctions, particularly when the patent holder is a nonpracticing entity.⁴⁶

2. *Ongoing Royalties*

Following *eBay*, courts have increasingly awarded ongoing royalties in lieu of a permanent injunction. This type of prospective relief had previously been relatively rare, and courts initially appeared to assume that postverdict royalties would be assessed in the same manner as royalties for past infringe-

⁴³ *KSM Fastening Sys. v. H.A. Jones Co.*, 776 F.2d 1522, 1524 (Fed. Cir. 1985); *see also* *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1247 (Fed. Cir. 1989) (“It is the general rule that an injunction will issue when infringement has been adjudged, absent a sound reason for denying it.”).

⁴⁴ 547 U.S. 388, 392–93 (2006).

⁴⁵ *Id.* at 391.

⁴⁶ *See, e.g.*, Colleen V. Chien & Mark A. Lemley, *Patent Holdup, the ITC, and the Public Interest*, 98 CORNELL L. REV. 1, 10 fig.1 (2012) (following *eBay* in awarding injunctions to 79% of practicing entities and 26% of nonpracticing entities). Relatedly, courts are often reluctant to enjoin the sale of an entire product when only a component of the product infringes. *See, e.g.*, *Apple, Inc. v. Samsung Elecs. Co.*, 678 F.3d 1314, 1327–28 (Fed. Cir. 2012) (finding no abuse of discretion in the district court’s denial of a preliminary injunction with respect to infringement of a patent on one feature of a multicomponent product); *cf.* *Apple, Inc. v. Samsung Elecs. Co.*, No. 2014-1802, 2015 WL 9014387, at *11 (Fed. Cir. Dec. 16, 2015) (finding abuse of discretion in district court’s denial of a permanent injunction that was limited to enjoining defendant’s use of infringing features).

ment.⁴⁷ In 2007 and 2008, however, the Federal Circuit decided a pair of cases holding that postverdict royalties may be based on facts different from those used by juries when determining royalties for preverdict infringement.

First, in *Paice LLC v. Toyota Motor Corp.*, the Federal Circuit affirmed a postverdict royalty as an alternative to awarding the plaintiff a permanent injunction but vacated the *amount* of the ongoing royalty.⁴⁸ The court held that the district court could not simply extend the jury's preverdict royalty rate without giving "any indication as to why that rate is appropriate."⁴⁹ *Paice* offered no explanation on two critical points: (1) why or under what circumstances the ongoing royalty rate should differ from the "reasonable royalty" awarded for preverdict infringement and (2) how district courts should determine the appropriate postverdict rate.⁵⁰

The Federal Circuit addressed these issues a few months later in *Amado v. Microsoft Corp.*⁵¹ On the first question, the court held that there is a "fundamental difference . . . between a reasonable royalty for pre-verdict infringement and damages for post-verdict infringement" because "[p]rior to judgment, liability for infringement, as well as the validity of the patent, is uncertain, and damages are determined in the context of that uncertainty."⁵² Therefore, the Federal Circuit concluded, the jury's reasonable royalty award should "logically" provide a floor for postverdict ongoing royalty rates.⁵³

On the second question, the *Amado* court instructed that, at least in that case, the district court should consider the following factors:

⁴⁷ See, e.g., *z4 Techs., Inc. v. Microsoft Corp.*, 434 F. Supp. 2d 437, 442 (E.D. Tex. 2006) (holding that postverdict royalties should be "based on the same reasonable royalty calculation used by the jury"); *Voda v. Cordis Corp.*, No. CIV-03-1512-L, 2006 WL 2570614, at *6 (W.D. Okla. Sept. 5, 2006) (denying a motion to sever the action to determine postverdict royalties because "there would be no issues for decision except simple mathematical calculations based on defendant's sales"), *aff'd*, 536 F.3d 1311 (Fed. Cir. 2008).

⁴⁸ 504 F.3d 1293, 1315 (Fed. Cir. 2007).

⁴⁹ *Id.*

⁵⁰ In a concurrence, Judge Rader stated that "pre-suit and post-judgment acts of infringement are distinct, and may warrant different royalty rates *given the change in the parties' legal relationship and other factors.*" *Id.* at 1317 (Rader, J., concurring) (emphasis added). He did not elaborate on what that meant.

⁵¹ 517 F.3d 1353 (Fed. Cir. 2008).

⁵² *Id.* at 1361-62.

⁵³ *Id.* at 1362 n.2. As discussed *infra* subpart III.D, the court's analysis is flawed because reasonable royalty awards for past infringement are determined on the assumption that the patent is valid and infringed. See, e.g., *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1325 (Fed. Cir. 2009) ("The hypothetical negotiation . . . assumes that the asserted patent claims are valid and infringed.").

the parties' bargaining positions, and the resulting change in economic circumstances, resulting from the determination of liability—for example, the infringer's likelihood of success on appeal, the infringer's ability to immediately comply with the injunction, the parties' reasonable expectations if the stay was entered by consent or stipulation, etc.—as well as the evidence and arguments found material to the granting of the injunction and the stay.⁵⁴

Following *Amado*, courts have looked to these factors for guidance but have not applied a consistent methodology in setting ongoing royalty rates.⁵⁵ What is clear, however, is that *Amado* approved the consideration of ex post developments.

C. Enhanced Damages and Willfulness

In addition to compensatory damages, the Patent Act allows for enhanced damages “up to three times the amount found or assessed.”⁵⁶ Although the statute does not provide a standard for determining when enhanced damages are appropriate, the Federal Circuit has interpreted the law to permit enhanced damages only on a finding of “willful infringement or bad faith.”⁵⁷

For many years, the Federal Circuit appeared to use a negligence standard for assessing willfulness. In 1983, in *Underwater Devices Inc. v. Morrison-Knudsen Co.*, the court held that one with “actual notice of another's patent rights” had “an affirmative duty to exercise due care to determine whether or not he is infringing,” including “the duty to seek and obtain competent legal advice from counsel *before* the initiation of any possible infringing activity.”⁵⁸

In 2007, however, the Federal Circuit overruled *Underwater Devices* in an en banc decision. In *In re Seagate Technology, LLC*, the Federal Circuit recognized that *Underwater Devices's*

⁵⁴ 517 F.3d at 1362.

⁵⁵ *Compare, e.g., Paice, LLC v. Toyota Motor Corp.*, 609 F. Supp. 2d, 620, 623–24 (E.D. Tex. 2009) (calculating ongoing royalty using *Georgia-Pacific* factors), *with Creative Internet Advert. Corp. v. Yahoo!, Inc.*, 674 F. Supp. 2d 847, 861 (E.D. Tex. 2009) (basing royalty on increase over jury-determined rate), *and Bos. Sci. Corp. v. Johnson & Johnson*, No. C 02-00790 SI, 2009 WL 975424, at *5–7 (N.D. Cal. Apr. 9, 2009) (reapplying *Georgia-Pacific* factors with different weights to calculate ongoing royalty).

⁵⁶ 35 U.S.C. § 284 (2012).

⁵⁷ *Beatrice Foods Co. v. New England Printing & Lithographing Co.*, 923 F.2d 1576, 1578 (Fed. Cir. 1991); *see also Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 508 (1964) (holding that a patent holder “could in a case of willful or bad-faith infringement recover punitive or ‘increased’ damages under the statute's trebling provision”).

⁵⁸ 717 F.2d 1380, 1389–90 (Fed. Cir. 1983).

negligence-like standard set a lower bar for willfulness in patent law than other areas of law.⁵⁹ The court adopted an objective recklessness standard for willfulness and abandoned potential infringers' affirmative duty of due care, including the obligation to obtain opinion of counsel.⁶⁰

The Federal Circuit in *Seagate* set forth a two-part test for willfulness. First, "to establish willful infringement, a patentee must show by clear and convincing evidence that the infringer acted despite an objectively high likelihood that its actions constituted infringement of a valid patent."⁶¹ If the threshold objective standard is satisfied, the patent holder then must demonstrate that the accused infringer either knew about this objectively defined risk or should have known because it was so obvious.⁶²

However, "a finding of willfulness does not require an award of enhanced damages; it merely permits it."⁶³ Courts use several factors to determine whether to enhance damages:

- (1) whether the infringer deliberately copied the ideas or design of another;
- (2) whether the infringer, when he knew of the other's patent protection, investigated the . . . patent and formed a good-faith belief that it was invalid or that it was not infringed; []
- (3) the infringer's behavior . . . [in] the litigation;
- (4) [the infringer's] size and financial condition;
- (5) [c]loseness of the case;
- (6) [d]uration of [the infringer's] misconduct;
- (7) [r]emedial action by the [infringer];
- (8) [infringer's] motivation for harm; [and]
- (9) [w]hether [the infringer] attempted to conceal its misconduct.⁶⁴

⁵⁹ *In re Seagate Tech., LLC*, 497 F.3d 1360, 1370 (Fed. Cir. 2007) (en banc) ("The term willful is not unique to patent law, and it has a well-established meaning in the civil context.").

⁶⁰ *Id.*

⁶¹ *Id.* at 1371.

⁶² *Id.*

⁶³ *Id.* at 1368.

⁶⁴ *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 826–27 (Fed. Cir. 1992) (footnotes and citations omitted). Although *Read* predated *Seagate*, "*Seagate* did not change the application of the *Read* factors with respect to enhancement of damages when willful infringement under [35 U.S.C.] § 285 is found." *Spectralytics, Inc. v. Cordis Corp.*, 649 F.3d 1336, 1349 (Fed. Cir. 2011).

D. Where Damages Law Is Today

As discussed above, *Georgia-Pacific* concerned an infringer that could have sought a license ex ante but did not do so.⁶⁵ Patent damages law appears to implicitly assume that such ex ante bargaining is feasible. The benchmark of the hypothetical ex ante bargain—what would have happened if the infringer had sought and obtained a license ex ante—is a natural way to frame the inquiry in that situation; and it thus understandably became the touchstone for patent damages law.

The courts lost sight, however, of that temporal focus, and have allowed ex post considerations to factor into the hypothetical ex ante negotiation.⁶⁶ If the parties would not have known about those ex post matters at the time of the ex ante bargain, introducing them into the analysis could lead to an erroneous determination of the royalty that the parties would have agreed to in that bargain. As explained in Part III below, that situation has become commonplace in recent years, as courts have used the evidentiary factors suggested in the earlier and very different cases in ways that have systematically led to inflated damage awards. The courts appear often not to have been mindful of this consequence and, even if mindful, might have thought it appropriate in the implicitly assumed paradigmatic case in which the infringer acted wrongfully.

II

THE PARADIGMATIC INFRINGEMENT STORY AND THE “DEVELOP WITHOUT FULL PRECLEARANCE” DYNAMIC

A. The Paradigmatic Infringement Story

Patent infringement is a strict liability offense, and patent damages law is based on an implicit, paradigmatic “story” in which the infringer is a bad actor.⁶⁷ In this story, the inventor conceives of an invention and either practices it personally or licenses others to do so. Others in the field are able to learn of the patent and either design around it or negotiate with the patent holder for a license. Under this view, ex ante licensing is both feasible and desirable. Infringement can occur only if the

⁶⁵ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1123 (S.D.N.Y. 1970).

⁶⁶ See, e.g., *id.* at 1118.

⁶⁷ See Jason A. Rantanen, *An Objective View of Fault in Patent Infringement*, 60 AM. U. L. REV. 1575, 1590 (2011) (discussing the strict liability nature of direct patent infringement). But see Saurabh Vishnubhakat, *An Intentional Tort Theory of Patents*, 68 FLA. L. REV. (forthcoming 2016) (arguing that direct patent infringement should be viewed as an intentional tort).

infringer behaves badly, either by misappropriating the ideas in a patent it knows about or by failing to search diligently for the patent in the first place. Inflation of reasonable royalty damages through the use of ex post considerations might seem unobjectionable or even desirable in this context, in which failing to obtain preclearance is implicitly regarded as wrongful.

This paradigmatic story—and patent law generally—takes no account of the information costs of finding and evaluating potentially relevant patents, nor of the negotiation costs involved in obtaining licenses. The patent system places the practical burden of avoiding infringement on potential infringers, and the damages calculus focuses on the patent holder. Hardship to the infringer is rarely taken into account and is not included among the *Georgia-Pacific* factors.⁶⁸

Historically, when patents were fewer and industries more compact, the infringer's information and negotiation costs may have been small enough that the paradigmatic story remained broadly true. And such patent preclearance still does occur today, in sectors such as pharmaceuticals and biotechnology where the potentially relevant patents are both reasonably ascertainable during the product development timeframe and relatively small in number.⁶⁹ Patent preclearance can and does occur among known competitors in other sectors as well, as firms are often well situated to monitor the patent estates and commercial developments of market participants; in this context, however, ex ante agreements often take the form of broad cross-licenses rather than product-specific licenses based on individually identified patents.⁷⁰ But the paradigmatic story no longer applies to much of the modern commercial landscape.

B. The “Develop Without Full Preclearance” Dynamic

Traditional conceptions regarding the feasibility and desirability of patent preclearance are often inapplicable to present-day circumstances. The explosion in the number of issued patents has created a different dynamic in many industries, especially in high-tech fields like IT. In these sectors, products have grown far more complex, and the number of potentially

⁶⁸ *Georgia-Pacific*, 318 F. Supp. at 1120.

⁶⁹ FED. TRADE COMM'N, *supra* note 3, at 81 (noting a consensus that “patent clearance [is] ‘mandatory’ in those sectors”).

⁷⁰ See Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POL'Y & ECON. 119, 122–24 (2000) (describing the use of cross-licenses in industries that have patent thickets).

relevant patents has increased exponentially.⁷¹ Several factors often combine to make wholesale preclearance infeasible: high search costs, high negotiation costs, and high costs of delay.

High Search Costs—The primary reason that firms in sectors such as IT cannot preclear patents is that the cost of searching for and identifying all potentially infringed patents is prohibitive.⁷² Part of this is the sheer number of patents that read on any given device in these fields. An average smartphone, for example, has been estimated to use over 250,000 different patented technologies held by many different owners.⁷³ A microprocessor may itself use thousands of patented technologies.⁷⁴ Many of these patents are of dubious validity.⁷⁵ The literature describes this virtually impenetrable set of overlapping potential patent rights as a “patent thicket.”⁷⁶ Firms cannot realistically hack through this thicket—that is, identify and evaluate all the possibly relevant patents—before starting to develop a new product.⁷⁷

Moreover, in the United States, even the most comprehensive search would not identify all of the relevant patents in the field. U.S. patent applications are typically not published until at least eighteen months after they are filed.⁷⁸ And the published applications are not definitive because the claims may change significantly during prosecution.⁷⁹ Thus, for any given product, there may be thousands of relevant nonpublic applications that literally cannot be identified before the product is developed and launched.

⁷¹ See, e.g., RPX Corp., Amendment No. 4 (Form S-1/A), 59 (Apr. 29, 2011) (“Based on our research, we believe there are more than 250,000 active patents relevant to today’s smartphones, a significant increase compared to our estimate of approximately 70,000 patents that were active and relevant to mobile phones in 2000.”).

⁷² See generally Tun-Jen Chiang, *The Reciprocity of Search*, 66 VAND. L. REV. 1, 31–32 (2013) (arguing that due to high search costs for technology users, it may be appropriate under certain circumstances to impose a duty on patentees to attempt to identify and negotiate licenses with potential infringers prior to their taking any infringing actions); Christina Mulligan & Timothy B. Lee, *Scaling the Patent System*, 68 N.Y.U. ANN. SURV. AM. L. 289, 307 (2012) (discussing the problem of high patent search costs).

⁷³ RPX Corp., Amendment No. 4 (Form S-1), 59 (Apr. 29, 2011).

⁷⁴ Lemley & Shapiro, *supra* note 4, at 2009.

⁷⁵ Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1496–1500 (2001) (discussing the Patent and Trademark Office’s low standard for approving patents).

⁷⁶ Shapiro, *supra* note 70, at 119.

⁷⁷ See Lemley & Melamed, *supra* note 9, at 2148.

⁷⁸ See 35 U.S.C. § 122 (2012); 37 C.F.R. § 1.14 (1967).

⁷⁹ FED. TRADE COMM’N, *supra* note 3, at 87–89.

Another source of high search costs is uncertainty as to what the claims mean. Many patents that might be identified as potentially relevant will turn out not to be infringed. For example, courts consider IT to be a “predictable” art,⁸⁰ meaning that one skilled in the art needs less specific guidance or direction from the patent.⁸¹ As a result, claims can be fairly imprecise and still not indefinite,⁸² and they can stray quite far from what the specification discloses and still satisfy the enablement⁸³ and written description requirements.⁸⁴ Moreover, structure and function intertwine closely in this area. Software, for example, can often be described as easily by what it does as by what it is.⁸⁵ All of this results in broad claims whose meaning remains vague until a court construes them.⁸⁶ Thus, even if a firm could identify a set of potentially relevant patents, it would still be an expensive and uncertain undertaking to determine which ones genuinely cover a particular product.⁸⁷

⁸⁰ *Troxler Elec. Labs., Inc. v. Pine Instrument Co.*, 597 F. Supp. 2d 574, 604 (E.D.N.C. 2009) (explaining that “electrical devices” are “well known and predictable technologies” (citing *In re Vaeck*, 947 F.2d 488, 496 (Fed. Cir. 1991))).

⁸¹ See, e.g., U.S. TRADE AND PATENT OFF., MANUAL OF PATENT EXAMINING PROCEDURE § 2164.03 (“The amount of guidance or direction needed to enable the invention is inversely related to the amount of knowledge in the state of the art as well as the predictability in the art. . . . [T]he more predictable the art is, the less information needs to be explicitly stated in the specification.” (citation omitted)).

⁸² *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014) (holding that indefiniteness depends upon whether one skilled in the art could understand a claim term).

⁸³ *Lift-U v. Ricon Corp.*, No. 10-CV-01850-LHK, 2011 WL 5118634, at *7 (N.D. Cal. Oct. 28, 2011) (“[In] a predictable art[,] . . . inventions may be enabled with relative ease.”).

⁸⁴ See *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc).

⁸⁵ FED. TRADE COMM’N, *supra* note 3, at 10, 84–85 (describing problems with “functional claiming”); Lemley & Melamed, *supra* note 9, at 2173–74.

⁸⁶ FED. TRADE COMM’N, *supra* note 3, at 80–86. The Supreme Court recently held that claims directed to an abstract idea are unpatentable under 35 U.S.C. § 101 even if they also recite the use of a generic computer to implement the abstract idea. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2357–59 (2014). It is still too early to gauge the effect this will have on overbroad IT claims and what fraction of them it will render invalid.

⁸⁷ Numerous scholars have proposed revisions to claim construction methodology to increase clarity and predictability. See, e.g., Jeffrey A. Lefstin, *Claim Construction, Appeal, and the Predictability of Interpretive Regimes*, 61 U. MIAMI L. REV. 1033, 1060–65 (2007) (discussing the relative merits of reforms at the trial court and appellate court levels); Kimberly A. Moore, *Are District Court Judges Equipped to Resolve Patent Cases?*, 15 HARV. J.L. & TECH. 1, 31–38 (2001) (recommending expedited appeal of claim constructions); David L. Schwartz, *Practice Makes Perfect? An Empirical Study of Claim Construction Reversal Rates in Patent Cases*, 107 MICH. L. REV. 223, 266–67 (2008) (proposing reforms of U.S. Patent

Still another reason for high search costs is the nature of modern devices. In fields like IT, products tend to include a large number of highly technical components, which are often supplied by a variety of different manufacturers.⁸⁸ The firm that makes the overall product often does not know the precise operation of all of the constituent components and thus cannot realistically search for patents that cover them.⁸⁹ But the firm is nevertheless liable if any component—either alone or in conjunction with other components of the larger product—infringes a particular patent.⁹⁰

Furthermore, nonpracticing entities (NPEs) or patent aggregators hold an ever-increasing number of patents.⁹¹ While a technology user might expect entities that make or sell certain types of products to have relevant patents, it is especially difficult to identify in advance potentially relevant but never-commercialized patents that are held by NPEs.

High Negotiation Costs—Even if a firm could identify all of the patents that read on a planned product and further determine which of those patents are likely valid, it would still be prohibitively expensive to negotiate licenses before developing and selling the infringing products. Modern devices may potentially infringe many thousands of patents held by numerous different owners,⁹² and a firm would have to negotiate a license with each of them individually.⁹³ That would rarely—if ever—be feasible, in part because of the transaction costs that would

and Trademark Office rules and processes to reduce claim construction uncertainty).

⁸⁸ FED. TRADE COMM'N, *supra* note 3, at 90–91.

⁸⁹ *Id.*

⁹⁰ In many cases, component manufacturers agree to indemnify the firm that makes the overall product, but these manufacturers are likewise constrained from preclearance by the dynamics of the field. Moreover, infringement often involves multiple components such that the entire product could infringe even though no individual component does, and even though no individual entity is aware of how all of the relevant components operate.

⁹¹ FED. TRADE COMM'N, *supra* note 3, at 8 n.5.

⁹² Lemley & Shapiro, *supra* note 4, at 2010–11 n.40 (collecting evidence of royalty stacking in the IT industry).

⁹³ Some commentators have argued that firms can navigate patent thickets and the high negotiation costs that result from them via various forms of collective action and cooperation such as patent pools, portfolio cross-licenses, and standard-setting activities. See, e.g., Michael A. Carrier, *Resolving the Patent-Antitrust Paradox Through Tripartite Innovation*, 56 VAND. L. REV. 1047, 1105 (2003) (discussing the use of cross-licenses and patent pools in the semiconductor and biotech sectors). Whatever the theoretical merit of this idea, it is clear that the forms of collective action that exist today have not begun to solve the problem. Even if such actions become more common in the future, there is no reason to think that they will eliminate or significantly reduce the costs and problems created when products read on tens of thousands of patents.

be incurred to negotiate individually with all of the relevant patent holders and in part because of the coordination problem and the likelihood of holdup by some patent holders if they know that the infringer needs to obtain a license from all of them before developing its product.⁹⁴

High Costs of Delay—A third factor is that many industries (such as IT) place a premium on quick development and time to market, and penalize delays harshly.⁹⁵ The delay involved in identifying and licensing relevant patents would make it impossible for a technology user to bring a product to market in anything close to a commercially reasonable time.⁹⁶ The product being developed would usually be obsolete before it could obtain all the licenses. If firms were required to obtain licenses to all potentially infringed patents before developing and marketing their products, the product development and innovation processes would, as a practical matter, come to a halt.

* * * * *

In sum, firms in IT and similarly crowded, fast-moving sectors simply cannot be expected to identify and license all relevant patents before developing their products. Some firms opt out of these markets entirely.⁹⁷ Those that remain are required to develop their products without the benefit of full preclearance.⁹⁸ This does not mean that these firms are willful or even knowing infringers. To the contrary, “[s]imultaneous invention and inadvertent infringement are . . . ubiquitous” in

⁹⁴ Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 19–20 (2008); Shapiro, *supra* note 70, at 120.

⁹⁵ Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 976–77 (2005) (“[I]nvestors commonly referred to lead time or first-mover advantages. The premise is that a portfolio company that truly is the first to provide a sophisticated and functional response to an important problem can expect to earn a supranormal return for years to come.” (footnote omitted)).

⁹⁶ See FED. TRADE COMM’N, *supra* note 3, at 91.

⁹⁷ See, e.g., Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 699 (1998) (noting that a “proliferation of patents on individual [gene] fragments” will lead to the underuse of research materials and the inhibition of research); Josh Lerner, *Patenting in the Shadow of Competitors*, 38 J.L. & ECON. 463, 465 (1995) (explaining that the threat of litigation deters smaller firms from entering areas of research where larger firms hold patents).

⁹⁸ FED. TRADE COMM’N, *supra* note 3, at 80 (observing that “IT firms . . . essentially ‘ignor[e] patents’” when developing their products (quoting Brian Kahin, Senior Fellow, Comput. & Commc’ns Indus. Ass’n, *The Patent Ecosystem in IT: Business Practice and Arbitrage*, at the FTC Hearing on: The Evolving IP Marketplace 61 (Dec. 5, 2008))).

these sectors.⁹⁹ But the net result is an efficient and socially desirable “develop without full preclearance” dynamic in which firms do not address potential infringement or negotiate licenses until after they are already committed to a particular design or method.

C. Lock-In Costs

When licenses are negotiated *ex post*, rather than *ex ante* (as the “paradigmatic story” assumes is possible), their value acquires a critical temporal dimension. For example, the value of the patented technology relative to alternatives might have increased or decreased for reasons that have little if anything to do with the infringer, such as market developments that make products using the patented technologies more or less in demand and valuable.

More important, in the interval between the *ex ante* hypothetical negotiation date and the *ex post* actual negotiation date (or the date when litigation damages are assessed), the infringer will usually have made substantial asset-specific investments tied to the infringing technology. It will have incorporated the technology into its products, configured factories to produce it, trained employees and customers in its use, and so on.¹⁰⁰ In sectors such as IT, which involve multicomponent products, interoperating components (e.g., a modem and a microprocessor) will often have been specially designed to work with the infringing technology.¹⁰¹ Complementary or peripheral devices (e.g., a computer monitor or keyboard), too, will often have been specially designed to work with an infringing product and may themselves implement the infringing technology solely in order to be compatible.¹⁰²

These direct and indirect investments in the infringing technology often make it very difficult for the infringer to switch to a different technology *ex post*.¹⁰³ The infringing firm and/or its suppliers and the producers of complements would have to

⁹⁹ Lemley & Melamed, *supra* note 9, at 2148. Studies indicate that fewer than 2% of infringement cases in the IT industry involved copying. Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1456 tbl.3 (2009); *see also* Mark A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 712–15 (2012) (discussing the frequency of simultaneous invention). *But see* Sichelman, *supra* note 9, at 544 (suggesting that copying is more common).

¹⁰⁰ Lemley & Melamed, *supra* note 9, at 2140.

¹⁰¹ Lemley & Shapiro, *supra* note 4, at 2016.

¹⁰² *Id.*

¹⁰³ CARL SHAPIRO & HAL R. VARIAN, *INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY* 105–10 (1999)

redesign products, retool factories, retrain employees, reeducate customers, and eliminate infringing inventory.¹⁰⁴ Components and/or complementary products, even those that do not themselves use the patented technology, may need to be replaced or modified to maintain compatibility. Ex post, the infringing firm would have to incur all of these costs in order to switch to an alternative technology, whether for present products or for subsequent-generation products. These are costs the infringing firm would not have had to incur if it had used the new technology ex ante, and they serve to “lock in” the firm to the infringing technology.¹⁰⁵

We use the term “lock-in costs” to refer to how much more it would cost the infringer to switch to an alternative technology ex post than it would have cost to switch ex ante.¹⁰⁶ These costs, which in effect reduce the value of the alternative, will often be substantial because of the infringer’s investments in the infringing technology. A numerical example makes this clear.

Suppose that the infringer can choose between the infringing technology (A) and the best noninfringing alternative (B). Suppose further that, ex ante, A would require an up-front cost of \$200 and generate operating profits of \$1,000, for a net value of \$800, while B would require an up-front cost of only \$100 but would generate operating profits of only \$850, for a net value of \$750. The ex ante value to the infringer of A relative to B is \$50. If B were an unpatented technology, the infringer would pay ex ante no more than \$50 for a license to A.

Now suppose the infringer (perhaps not knowing of the patent) implements the infringing technology A and pays the \$200 up-front cost, none of which can be repurposed for technology B. Ex post, holding everything else constant, the infringer expects a full \$1,000 payoff from using A. B, by contrast, still has an expected payoff of only \$750. Thus, the ex post value to the infringer of A relative to B is \$250. The infringer would pay ex post up to that amount to avoid having to switch to B. The infringer’s lock-in cost is \$200—the difference

¹⁰⁴ *Id.* at 111.

¹⁰⁵ The third parties’ switching costs are properly regarded as part of the infringer’s lock-in costs because the infringer will need to compensate those parties in some manner to induce them to make the adjustments required to facilitate its technology change.

¹⁰⁶ These costs are also sometimes referred to as “switching costs.” We use the term lock-in costs to emphasize that we are addressing the costs that arise solely from the commitment to the technology, and not those related to the incremental advantage of the patented technology compared to alternatives.

between the ex post value (\$250) and the ex ante value (\$50). The infringer is willing to pay an additional \$200 ex post, even though the patented technology is unchanged and the patent holder has done nothing to increase its value since the ex ante period.¹⁰⁷

The “develop without full preclearance” dynamic creates substantial lock-in costs—often many times larger than the ex ante value of the invention itself.¹⁰⁸ This is particularly true when the infringing feature is a small part of a larger device.¹⁰⁹ In such cases, the entire product (or large parts of it, including many noninfringing features) may need to be redesigned in order to avoid using the infringing feature.¹¹⁰

III

CURRENT LAW SYSTEMATICALLY OVERCOMPENSATES PATENT HOLDERS

Courts and scholars broadly agree that a reasonable royalty should not exceed a patented invention’s economic benefits over the available alternatives.¹¹¹ An infringer would not pay more than the value of those incremental benefits in an ex ante bargain, so focusing on those benefits aligns the damages awarded after infringement with the market value (if there had been a market) of the patented technology before lock-in. Assuming the appropriateness of other aspects of patent law, awarding reasonable royalty damages based upon the incre-

¹⁰⁷ It is possible that the ex post up-front costs for B will be greater than the \$100 ex ante up-front costs. For example, it might cost more to convert a production line built for A to be suitable for B than it would have cost to build the production line for B ex ante. In that event, the net value of B ex post would be less than \$750, the infringer would be willing to pay more than \$250 for a license to A, and the lock-in cost would be greater than \$200.

¹⁰⁸ Cf. Lemley & Shapiro, *supra* note 4, at 2009 (explaining that “companies are paying holdup money to avoid the threat of infringement”).

¹⁰⁹ See *id.* at 1996–98, 2009.

¹¹⁰ See FED. TRADE COMM’N, *supra* note 3, at 78; Lemley & Melamed, *supra* note 9, at 2140; Lemley & Shapiro, *supra* note 4, at 2009.

¹¹¹ See *supra* notes 9–14 and accompanying text; see also, e.g., Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 627–39 (2010); Jarosz & Chapman, *supra* note 9, at 795; Lemley & Shapiro, *supra* note 4, at 1996; Christopher B. Seaman, *Reconsidering the Georgia-Pacific Standard for Reasonable Royalty Patent Damages*, 2010 BYU L. REV. 1661, 1711–12 (2010); see also FED. TRADE COMM’N, *supra* note 3, at 140–41 (endorsing this principle in an FTC Report based on input from over 140 participants, including business representatives from large and small firms, startups, the independent inventor community, leading patent practitioners, economists, and patent law scholars, as well as over fifty written submissions). For a list of Federal Circuit cases citing this proposition, see CHISUM, *supra* note 18, at § 20.07[2][e].

mental benefit of the patented technology provides appropriate incentives both for patent holders to innovate and for “innocent”¹¹² parties to develop and commercialize products despite the risk that they may face liability for patent infringement.¹¹³

There is also broad agreement that a sound way of assessing the market value of the patented technology is to imagine a hypothetical ex ante negotiation between a willing licensee and a willing licensor—provided that the hypothetical negotiation framework is carefully and properly applied.¹¹⁴ For this, it is critical that the hypothetical negotiation be based solely on ex ante considerations.¹¹⁵ The use of ex post considerations allows the patent holder to extract a premium—above the ex ante value of the invention—based on factors like lock-in costs.¹¹⁶ Current law, however, allows ex post considerations to corrupt the hypothetical negotiation in a variety of ways.¹¹⁷

¹¹² Current law distinguishes between ordinary and willful infringement. We propose a different distinction, between “guilty” and “innocent” infringement, *infra* Part IV.

¹¹³ FED. TRADE COMM’N, *supra* note 3, at 160.

¹¹⁴ *Id.* at 175. Some scholars, however, have advocated the elimination of the hypothetical negotiation construct in favor of alternative methods of valuing the patented technology based on ex post evidence. See, e.g., Jarosz & Chapman, *supra* note 9, at 811–12; David O. Taylor, *Using Reasonable Royalties to Value Patented Technology*, 49 GA. L. REV. 79, 126–27 (2014).

¹¹⁵ The hypothetical negotiation construct is premised on the parties’ mutual understanding that the patent is valid and infringed. See *infra* Section III.D.1. Thus, any ex post knowledge with respect to validity or infringement is irrelevant to the hypothetical negotiation itself.

¹¹⁶ Lemley & Shapiro, *supra* note 4, at 2009.

¹¹⁷ Separate from these concerns about ex post contamination, the Federal Circuit has recently suggested that the concept of an infringing sale “within the United States” for purposes of 35 U.S.C. § 271(a) may encompass sales of products within the United States even though those products are not made in the United States and never enter the United States. See *Carnegie Mellon Univ. v. Marvell Tech. Grp., Ltd.*, No. 2014–1492, 2015 WL 4639309, at *21, *24 (Fed. Cir. Aug. 4, 2015) (remanding for a retrial regarding the location of sales of defendant’s products and the significance of the defendant’s “design win” that resulted in an extended worldwide sales cycle in which the defendant sold products incorporating the allegedly infringing technology). The Federal Circuit did not resolve the issue of how the location of a “sale” is to be determined, noting that “[t]he standards for determining where a sale may be said to occur do not pinpoint a single, universally applicable fact that determines the answer, and it is not even settled whether a sale can have more than one location.” *Id.* at *21. To the extent this issue is resolved in such a way that a patent holder can claim a royalty for wholly extraterritorial activities, such an expansion of U.S. patent law would similarly overcompensate patent holders and disincentivize follow-on innovation (for example, by potentially exposing technology users to overlapping domestic and foreign remedies for the same infringing activity).

A. Current Reasonable Royalty Law Overcompensates Patent Holders by Contaminating the Hypothetical Negotiation with Ex Post Considerations

Reasonable royalty law, drawing on the paradigmatic story of the infringer as the guilty party, was not developed with significant consideration of potential harms to the infringer, and did not focus on the ways in which ex post evidence could distort the determination of the reasonable royalty.¹¹⁸ Ex post valuations and lock-in costs have thus been allowed to contaminate the purportedly ex ante hypothetical negotiation in a variety of ways: the so-called “book of wisdom” doctrine, the way the *Georgia-Pacific* factors are commonly used to determine reasonable royalties, and the selection of the hypothetical negotiation date.¹¹⁹

1. *Ex Post Contamination via the “Book of Wisdom” Doctrine*

Development of the Doctrine—The “book of wisdom” doctrine provides that a royalty rate may be determined based in part upon events after the hypothetical negotiation date.¹²⁰ It originated in a 1933 Supreme Court decision, *Sinclair Refining Co. v. Jenkins Petroleum Process Co.*¹²¹ *Sinclair* did not, however, concern the determination of a reasonable royalty for purposes of assessing patent infringement damages. Instead, the task before the court was how to determine the appropriate measure of damages for breach of a contract to assign a patent in order to put the intended assignee in the same position as it would have been in had there been no breach (i.e., if the patent been assigned to it as promised).¹²² Justice Cardozo wrote in that context that “[t]he [subsequent] use that has been made of the patented device is a legitimate aid to the appraisal of the value of the patent at the time of the breach.”¹²³ Ex post experience is a “book of wisdom” that should be used to “bring out and expose to light the elements of value that were [in the

¹¹⁸ See *supra* section I.A.2.

¹¹⁹ *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1579 (Fed. Cir. 1996); *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554 (Fed. Cir. 1995).

¹²⁰ See, e.g., *Fromson v. W. Litho Plate & Supply Co.* 853 F.2d 1568, 1575–76 (Fed. Cir. 1988), *overruled in part on other grounds by* *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337 (Fed. Cir. 2004) (discussing the book of wisdom doctrine); see generally Jarosz & Chapman, *supra* note 9, at 801–03 (discussing the application of the book of wisdom doctrine to permit consideration of ex post facts in setting a reasonable royalty).

¹²¹ 289 U.S. 689 (1933).

¹²² *Id.* at 697–99.

¹²³ *Id.* at 697.

patent] from the beginning.”¹²⁴ That reasoning is both sound and uncontroversial—had there been no breach, the plaintiff would have owned the patent *ex post*, and it was appropriate to determine the patent’s worth at that time.

The Federal Circuit engrafted the book of wisdom doctrine onto the reasonable royalty analysis in *Fromson v. Western Litho Plate & Supply Co.*,¹²⁵ which involved willful infringement.¹²⁶ Citing *Sinclair* despite the very different problem it addressed, the Federal Circuit held that even though the law “speaks of negotiations as of the time infringement began,” it still “permits and often requires a court to look to events and facts that occurred thereafter.”¹²⁷

The court said that even *ex post* facts that “could not have been known to or predicted by the hypothesized negotiators” may be considered,¹²⁸ but it did not rely on such *ex post* evidence either to set a royalty rate or in explaining why the district court erred. Instead, the court vacated the district court’s reasonable royalty determination because it found that the court had committed several errors, including failing to explain why it disregarded “testimony and documents” showing that the infringer predicted *ex ante* “high profits and prices.”¹²⁹ Nevertheless, following *Fromson*, courts have regularly relied on the book of wisdom doctrine to permit the consideration of *ex post* developments, regardless whether those *ex post* developments provided any insight into the parties’ *ex ante* bargaining positions or whether the case involved willful infringement.¹³⁰

¹²⁴ *Id.* at 698.

¹²⁵ 853 F.2d 1568, 1575 (Fed. Cir. 1988).

¹²⁶ *Id.* at 1572–73.

¹²⁷ *Id.* at 1575.

¹²⁸ *Id.*

¹²⁹ *Id.* at 1577.

¹³⁰ See, e.g., *Advanced Tech. Incubator, Inc. v. Sharp Corp.*, No. 2:07-CV-468, 2009 WL 4723733, at *5 (E.D. Tex. Sept. 8, 2009) (denying motion to exclude expert testimony based on consideration of information that postdated the hypothetical negotiation date); *Ariba, Inc. v. Emptoris, Inc.*, 567 F. Supp. 2d 914, 917 (E.D. Tex. 2008) (“The jury may consider the infringer’s actual sales and revenue up to the date of trial as part of the ‘book of wisdom.’”); *Honeywell Int’l, Inc. v. Hamilton Sundstrand Corp.*, 378 F. Supp. 2d 459, 462, 466 (D. Del. 2005) (concluding that damages calculation could be based on “sales projections of the accused product that did not exist at the time of the hypothetical negotiation”); *St. Clair Intellectual Prop. Consultants, Inc. v. Canon, Inc.*, No. Civ.A. 03–241 JJF, 2004 WL 2213562, at *2 (D. Del. Sept. 28, 2004) (“[C]ourts may consider events after the date infringement began as a basis for inferring what the pre-infringement negotiated value of a license would have been.”).

Application of the Doctrine—There are two rationales for applying the book of wisdom doctrine, which point to very different uses of ex post information. One rationale is *evidentiary*. Without an established market price, it is difficult to discern what the parties expected ex ante or what royalty they would have negotiated.¹³¹ Later events can be evidence of what the parties thought *at the time*.¹³² For example, as one commentator has noted, “actual sales might be a reasonable guide to the parties’ forecast of sales at the time of the hypothetical negotiation if there is no evidence that the parties were substantially surprised by actual events.”¹³³

This appears to be what the Federal Circuit actually did in *Fromson* and is in principle an appropriate use of ex post information (setting aside practical concerns about whether such ex post information might be unduly prejudicial in practice). It maintains the focus on determining the parties’ ex ante positions and does not introduce considerations unrelated to the ex ante market value of the patented technology—such as lock-in costs. Some courts have adopted this limited approach.¹³⁴

But there is a second rationale for using the book of wisdom that is more problematic. This rationale is *substantive*. Some courts and commentators argue that a purely ex ante hypothetical negotiation can undercompensate patent holders—for example, if profits on the infringing products turn out to have been higher than the parties projected ex ante.¹³⁵

¹³¹ See FED. TRADE COMM’N, *supra* note 3, at 166–67.

¹³² See *id.*; Gregory K. Leonard, Comments on *Evolving IP Marketplace*, FTC Project No. P093900, at 14.

¹³³ Leonard, *supra* note 132, at 14.

¹³⁴ See, e.g., *Integra Lifesciences I, Ltd. v. Merck KGaA*, 331 F.3d 860, 869–72 (Fed. Cir. 2003), *vacated on other grounds*, 545 U.S. 193 (2005) (remanding for reconsideration of damages and instructing the district court to consider how the parties would have valued the patented invention at the time of the hypothetical negotiation); *Studiengesellschaft Kohle v. Dart Indus., Inc.*, 862 F.2d 1564, 1572 (Fed. Cir. 1988) (affirming the district court’s consideration of an ex post settlement agreement, finding that it was probative of the parties’ expectations at the time of the hypothetical negotiation); *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, No. C 09–5235 MMC, 2014 WL 4437631, at *3–4 (N.D. Cal. Sept. 9, 2014) (“While Dr. Putnam did, as noted, look at actual sales figures from subsequent years, he explained that his opinion as to a reasonable royalty was based on losses the parties reasonably would have anticipated in light of information available to them at the time of the negotiation” (citations omitted)); *St. Clair*, 2004 WL 2213562, at *2–3 (“[C]ourts may consider events after the date infringement began as a basis for inferring what the pre-infringement negotiated value of a license would have been.”).

¹³⁵ See, e.g., *Trans-World Mfg. Corp. v. Al Nyman & Sons, Inc.*, 750 F.2d 1552, 1568 (Fed. Cir. 1984) (“If, for example, sales were increased because of [an] infringing use . . . , that fact could affect the amount of royalties a potential licensee would be willing to pay.”); *Honeywell*, 378 F. Supp. 2d at 464–66 (arguing that

Under the paradigmatic story, in which the infringer is seen as the guilty party, this outcome might be thought to give the infringer a windfall. Some courts have thus suggested that this outcome would not meet the requirements of the Patent Act because the patent holder would not be fully compensated for “the use made of the invention by the infringer.”¹³⁶

This rationale leads to the use of ex post evidence to supplant, rather than merely clarify, the bargain that would have resulted from an ex ante hypothetical negotiation.¹³⁷ It embodies two substantive mistakes: First, the rationale assumes that the actual profits would have been unforeseen entirely at the time of the hypothetical negotiation, when the parties negotiating ex ante would likely have understood that there would be a range of possible outcomes (some leading to higher profit and some leading to little or no profit for the infringer) and would have taken all of them into account in selecting a reasonable royalty ex ante. Second, as we explain below, a royalty determined on the basis of ex post evidence will generally include a premium based on ex post economic developments that increase the infringer’s reliance on the patent—in particular, lock-in costs—and that are unrelated to the incremental benefit the patent confers.¹³⁸

There is another problem with this approach. Because the rationale is meant to avoid undercompensating the patent holder, often the only ex post information considered is that which tends to *increase* the royalty rate. Ex post information that would tend to reduce the royalty, such as evidence that actual profits were less than what the parties would have expected, is often ignored.¹³⁹

section 284 contemplated consideration of ex post data so as not to undercompensate the patent holder); *see also* Jarosz & Chapman, *supra* note 9, at 801 (“[I]f realized profits greatly exceed expected profits, a reasonable royalty determined using only ex ante information may substantially undercompensate the patent holder.”).

¹³⁶ *Honeywell*, 378 F. Supp. 2d at 465 (emphasis omitted) (quoting 35 U.S.C. § 284 (2012)).

¹³⁷ *See id.* at 464–66; Leonard, *supra* note 132, at 14. As Judge Gooding has demonstrated, such use of ex post information is inconsistent with market valuation practices in other contexts such as tax, accounting, and estate administration. *See* Martha K. Gooding, *Reasonable Royalty Patent Damages: A Proper Reading of the Book of Wisdom*, BNA PAT. TRADEMARK & COPYRIGHT J. (2014).

¹³⁸ *See supra* section III.A.3.

¹³⁹ *See, e.g.,* Interactive Pictures Corp. v. Infinite Pictures, Inc., 274 F.3d 1371, 1384–85 (Fed. Cir. 2001) (finding that evidence of lower-than-projected sales could not be used to reduce reasonable royalty); Radio Steel & Mfg. Co. v. MTD Prods., Inc., 788 F.2d 1554, 1557 (Fed. Cir. 1986) (upholding royalty rate of 10% even though it exceeded the infringer’s actual profits); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1081 (Fed. Cir. 1983) (affirming reasonable

In short, the evidentiary version of the book of wisdom rule does not systematically overcompensate patent holders, but the substantive version does.¹⁴⁰ In practice, courts use both, and there is no consensus in the cases that the evidentiary version represents the better policy. In *Honeywell International, Inc. v. Hamilton Sundstrand Corp.*,¹⁴¹ for example, the court expressly considered both versions and opted for the substantive one out of a desire to avoid undercompensating the patent holder.¹⁴²

Even where the evidentiary version is used, moreover, ex post information may still contaminate the hypothetical negotiation if it is not used with careful focus on its limited evidentiary purpose.¹⁴³

2. *Ex Post Contamination via the Georgia-Pacific Factors*

The *Georgia-Pacific* factors themselves introduce ex post contamination into the hypothetical negotiation in two ways. First, the “comparable” licenses to be considered are often the product of ex post bargaining and therefore reflect ex post considerations such as lock-in costs, as well as premiums to account for uncertainty related to potential litigation outcomes.¹⁴⁴ Second, several of the other *Georgia-Pacific* factors consider the total ex post value of the patent in the infringing product, rather than the incremental benefit compared to the best ex ante alternative.¹⁴⁵

royalty that left infringer with no profit on the grounds that “[w]hether, as events unfurled thereafter, [the infringer] would have made an actual profit, while paying the royalty determined as of [the date of first infringement], is irrelevant” (quoting *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1164 (6th Cir. 1978)).

¹⁴⁰ See Leonard, *supra* note 132, at 14.

¹⁴¹ 378 F. Supp. 2d 459 (D. Del. 2005).

¹⁴² See *id.* at 464–66.

¹⁴³ See, e.g., *Aqua Shield v. Inter Pool Cover Team*, 774 F.3d 766, 770–71 (Fed. Cir. 2014) (“In hypothetical-negotiation terms, the core economic question is what the infringer, in a hypothetical pre-infringement negotiation under hypothetical conditions, would have *anticipated* the profit-making potential of use of the patented technology to be, compared to using non-infringing alternatives.”); *Rembrandt Social Media, LP v. Facebook, Inc.*, 561 F. App’x 909, 912 (Fed. Cir. 2014) (“[T]he aim of the reasonable-royalty calculation is to measure the market value of the invention itself—what it is worth to potential users, compared to their using only noninfringing technologies.”); *Riles v. Shell Expl. & Prod. Co.*, 298 F.3d 1302, 1312 (Fed. Cir. 2002) (“The economic relationship between the patented method and non-infringing alternative methods, of necessity, would limit the hypothetical negotiation.”); *Hughes Tool Co. v. G. W. Murphy Indus.*, 491 F.2d 923, 930–31 (5th Cir. 1973) (“The existence of a non-infringing alternative reduces the value of the patent and thus the damages from infringement.”).

¹⁴⁴ See *infra* subsection III.A.2.a.

¹⁴⁵ See *infra* subsection III.A.2.b.

a. *Factors Directed to Comparable Licenses*

The first two *Georgia-Pacific* factors relate to comparable licenses. Factor 1 addresses the royalties that the patent holder has received for licensing the patent-in-suit.¹⁴⁶ Factor 2 addresses the royalties that have been paid for comparable patents.¹⁴⁷

This reliance on comparable licenses is problematic for several reasons. First, it is often difficult to ascertain the actual terms of the entire agreement between the parties and to determine the royalties paid for the patents-in-suit.¹⁴⁸ Patent holders, knowing that their licenses will influence royalty awards in future litigation, have an incentive to structure their agreements in ways that exaggerate the apparent cost of the licenses to the licensees. For example, they can provide various types of consideration in addition to the patent license itself and allocate a disproportionate share of the total amount paid by the licensee for the package to the patent license. The licensee will generally have little or no incentive to resist such a disproportionate allocation because it will have a license and will not be affected by the patent holder's use of the license as a benchmark in negotiations or litigation with other technology users.

Second, many licenses—especially those in fields with a “develop without full preclearance” dynamic—are negotiated after the licensee has already begun practicing the licensed patent.¹⁴⁹ At that point, the infringer is already locked in to the patented technology and is likely to agree to a license fee that is far greater than the fee to which it would have agreed *ex ante*, when it was not locked in. But this increase in the infringer's willingness to pay does not reflect any increase in the merits of the patented technology.

Third, virtually all licenses—even those that do not arise directly out of litigation—are negotiated in “the shadow of the law” and reflect the parties' litigation expectations.¹⁵⁰ In the case of *ex post* licenses, the implementer has already commit-

¹⁴⁶ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

¹⁴⁷ *Id.*

¹⁴⁸ See Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. L. & ECON. REV. 280, 300–01 (2010).

¹⁴⁹ See *supra* subpart II.B.

¹⁵⁰ The term originated in Robert H. Mnookin & Lewis Kornhauser, *Bargaining in the Shadow of the Law: The Case of Divorce*, 88 YALE L.J. 950, 968 (1979) (noting that “[d]ivorcing parents do not bargain over the division of family wealth and custodial prerogatives in a vacuum; they bargain in the shadow of the law”).

ted the allegedly infringing acts and knows that the likely alternative to a negotiated license is litigation. The implementer no longer has the option of walking away from the deal and not using the technology. The amount the implementer is willing to pay for a license is largely driven, not by the value of the patented technology relative to the best alternative, but by the implementer's prediction about the consequences of litigation. In an *ex ante* bargain, by contrast, the implementer can walk away and the alternative to taking a license is the next-best commercial option, not litigation.¹⁵¹

Patent lawsuits are notoriously expensive¹⁵² and notoriously uncertain.¹⁵³ As explained in subpart III.B below, various limitations on the litigation process tend to lead courts and juries to overestimate the value of the patents-in-suit when determining damages. Further, collateral considerations—such as the harm that even a nonmeritorious allegation of patent infringement could have with respect to potential investors, customers, or ongoing business operations—may prompt firms to agree to pay a license for an amount far greater than the benefit conferred by the patent itself.¹⁵⁴ Thus, firms regularly pay a premium to avoid litigation, even for licenses to patents of questionable value.¹⁵⁵

¹⁵¹ Royalty rates agreed to in an *ex ante* bargain might be less than the appropriate reasonable royalty remedy because the negotiated rate will sometimes embody a discount to reflect the possibility that the patent is invalid or not infringed. Court-ordered royalties are determined on the assumption that the patent is valid and infringed. See *infra* section III.D.1.

¹⁵² AM. INTELLECTUAL PROP. LAW ASS'N., REPORT OF THE ECONOMIC SURVEY 35 (2013) (reporting that average litigation costs for a patent infringement action increased to roughly \$2.4 million, when the amount in dispute was \$1–25 million, or \$5 million, when over \$25 million was in dispute); Hon. Kathleen M. O'Malley et al., *A Panel Discussion: Claim Construction from the Perspective of the District Judge*, 54 CASE W. RES. L. REV. 671, 681 (2004) (stating that “run of the mill” patent cases cost \$1.2 million in attorneys’ fees to get through claim construction).

¹⁵³ See James Bessen & Michael J. Meurer, *Lessons for Patent Policy from Empirical Research on Patent Litigation*, 9 LEWIS & CLARK L. REV. 1, 2 (2005); Christopher R. Leslie, *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 MINN. L. REV. 101, 132–37 (2006).

¹⁵⁴ See, e.g., Fiona M. Scott Morton & Carl Shapiro, *Strategic Patent Acquisitions*, 79 ANTITRUST L.J. 463, 472–75 (2014) (“[A patent-assertion entity] can file a significant lawsuit just prior to the target’s IPO or other funding event. If the lawsuit scares off investors, the news could drive down the price of the IPO. This threat can allow the [patent-assertion entity] to extract a significant fraction of the value of the business in the form of licensing payments.”).

¹⁵⁵ See, e.g., Shapiro, *supra* note 148, at 289 (“Even though the parties do not litigate in equilibrium, the rules regarding injunctions and damages do affect the equilibrium royalty rate because they affect the parties’ payoffs from litigation, and the parties negotiate a licensing agreement in the shadow of litigation.”); see

Courts have recognized that licenses negotiated to settle litigation should not be considered under *Georgia-Pacific* Factors 1 and 2 because they are “tainted by the coercive environment of patent litigation,”¹⁵⁶ but they have failed to recognize that virtually all ex post licenses share this taint because they are negotiated in the shadow of litigation. As a result, the royalties agreed to in seemingly “comparable” ex post licenses considered under the *Georgia-Pacific* factors are inflated to reflect litigation considerations unrelated to the ex ante value of the patent itself.¹⁵⁷

b. *Other Factors Directed to Ex Post Valuation of the Patent*

Ex post considerations also make their way into the hypothetical negotiation through other *Georgia-Pacific* factors that consider the ex post benefits of the infringing product overall, without regard to whether those benefits would have affected the hypothetical ex ante license negotiations in the particular case. These include:

Factor 6: “The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or conveyed sales.”¹⁵⁸

Factor 8: “The established profitability of the product made under the patent; its commercial success; and its current popularity.”¹⁵⁹

Factor 10: “The nature of the patented invention; the character of the commercial embodiment of it as owned and pro-

also *infra* section III.D.1 (discussing the effect of injunction law on licenses to avoid litigation).

¹⁵⁶ *LaserDynamics, Inc. v. Quanta Comput., Inc.*, 694 F.3d 51, 77–78 (Fed. Cir. 2012); see also *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1078–79 (Fed. Cir. 1983) (noting that offers made after “litigation was threatened or probable” are not evidence of established royalties).

¹⁵⁷ In theory, some ex post licenses could result in lower royalties if the ex post developments indicate that the patent is less valuable than would have been expected ex ante. But lock-in would counteract this effect. More important, patent holders are likely to focus their enforcement efforts on patents that have succeeded ex post, not those that have proven to have little if any value (though, of course, some patent holders—such as those whose products have failed in the marketplace—may turn to litigation in an attempt to monetize even commercially unsuccessful patents).

¹⁵⁸ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

¹⁵⁹ *Id.*

duced by the licensor; and the benefits to those who have used the invention.”¹⁶⁰

Factor 11: “The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.”¹⁶¹

Factor 13: “The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.”¹⁶²

The use of ex post information encompassed by these factors tends to overcompensate patent holders because of the confluence of two elements. First, patent holders are more likely to assert patents when they claim technologies used in commercially valuable products than when the products in which they are used have little value. Second, just as royalties agreed to ex post are likely to be larger than those agreed to ex ante, so the *Georgia-Pacific* factors listed above imply greater value at a later time, when the commercial prospects of the products using the patented technology seem assured, than ex ante, when the commercial prospects are uncertain.

Several of these factors have another, and in some ways more fundamental, problem. Factors 6, 8, and 10 explicitly take into account benefits to the infringer from the combination of the patented technology and other products or components.¹⁶³ An ex ante bargain would take such matters into account only to the extent both that they were anticipated and that neither they nor some alternative source of value would have been realized if the infringer had chosen an alternative to the patented technology. For example, if a different technology would also have promoted “sales of other products of the licensee” (Factor 6), that benefit would not be part of the ex ante benefit of the patented technology compared to alternatives and would thus not have been taken into account in determining the royalty ex ante. Similarly, to the extent that the infringing product would have been a “commercial success” (Factor 8) with an alternative technology, the prospect of its ex post success would not have inflated the royalty agreed to ex ante.

To avoid or at least minimize these problems, these factors must be interpreted in light of the best alternative available at the time of the hypothetical ex ante negotiation. For example,

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

¹⁶² *Id.*

¹⁶³ *Id.*

the “portion of the realizable profit that should be credited to the invention” (Factor 13) should be interpreted to mean the incremental profit anticipated *ex ante*—i.e., the excess profit from using the patented technology beyond what would have been obtained using the next-best alternative available on the hypothetical negotiation date.¹⁶⁴ A few judicial decisions have moved in this direction.¹⁶⁵ But most cases continue to treat the availability of noninfringing alternatives as just another factor (Factor 9) to be considered on equal footing with the others.¹⁶⁶ Properly understood, however, the alternatives put a ceiling on the amount a willing licensee would pay *ex ante*, because it would not pay more than the patent is worth compared the alternative of not taking a license.¹⁶⁷

3. *The Hypothetical Negotiation is Often Assumed to Take Place After Lock-In*

Development of the Doctrine—The earliest case to employ the “hypothetical negotiation” construct to assess a reasonable royalty for patent infringement—and the first to state that the negotiation should be set at the time of first infringement—was *A. Mecky Co. v. Garton Toy Co.*¹⁶⁸ Although several earlier cases arguably suggested a similar approach by stating that a reasonable royalty should be based on the “market value” of the infringed patent, these prior decisions did not explain how that value should be determined.¹⁶⁹

In *A. Mecky*, a special master awarded a reasonable royalty of \$1 per unit—slightly higher than the defendant’s per unit

¹⁶⁴ See generally William C. Rooklidge, *Infringer’s Profits Redux: The Analytical Method of Determining Patent Infringement Reasonable Royalty Damages*, PAT. TRADEMARK & COPYRIGHT J. (Nov. 5, 2014) (demonstrating that, to the extent an infringer’s profits are taken into account in determining a reasonable royalty, courts should consider only the anticipated (*ex ante*) profits rather than the actual (*ex post*) profits).

¹⁶⁵ See, e.g., *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1351 (Fed. Cir. 1999) (“[O]nly by comparing the patented invention to its next-best available alternative(s)—regardless of whether the alternative(s) were actually produced and sold during the infringement—can the court discern the market value of the patent owner’s exclusive right.”).

¹⁶⁶ For examples of cases that fail to give particular weight to the incremental benefit of practicing the claimed invention as compared to the available noninfringing alternatives, see *Medtronic Sofamor Danek USA, Inc. v. Globus Med., Inc.*, 637 F. Supp. 2d 290, 309–11 (E.D. Pa. 2009); *Procter & Gamble Co. v. Paragon Trade Brands, Inc.*, 989 F. Supp. 547, 607–15 (D. Del. 1997); *Pentech Int’l, Inc. v. Hayduchok*, 931 F. Supp. 1167, 1174–77 (S.D.N.Y. 1996).

¹⁶⁷ See *Seaman*, *supra* note 111, at 1711–12.

¹⁶⁸ 277 F. 507, 511–13 (E.D. Wis. 1921).

¹⁶⁹ See *U.S. Frumentum Co. v. Lauhoff*, 216 F. 610, 617 (6th Cir. 1914); *Bemis Car Box Co. v. J. G. Brill Co.*, 200 F. 749, 759 (3d Cir. 1912).

profit—in light of the defendant’s willful infringement.¹⁷⁰ The district court held that it was error to consider willfulness in setting the royalty rate¹⁷¹ and that a reasonable royalty should be determined by “endeavoring to ascertain what these parties would say to each other, if, being honorable business rivals, the defendant should desire, and the plaintiff should be willing to grant, a license upon reasonable terms.”¹⁷² The court added that “[i]t is quite clear that in the application of the rule care should be taken to ascertain reasonableness of a royalty as of the time and under the circumstances attending the commencement and duration of the infringement.”¹⁷³

Other early cases held that reasonable royalties should be determined with reference to the date of first infringement on the grounds that that is when the availability of noninfringing alternatives is relevant to assessing the patent’s value. The source of this reasoning can be traced to *Columbia Wire Co. v. Kokomo Steel & Wire Co.*¹⁷⁴ After noting the general rule that an infringer is liable for all advantages gained from using an infringing machine over the next-best alternative, the Seventh Circuit considered whether the proper comparison was to the alternatives available at the time the patent issued or to the alternatives available fifteen years later, when infringement began.¹⁷⁵ The court found that when the patent issued, the best available alternative was far inferior to the patented technology, while at the time infringement began, the best available alternatives were actually more efficient than the patented technology and it would have cost the defendant nothing to switch.¹⁷⁶ The court held that “an infringer is only to pay for the advantages of the patented machine over machines that were open to his use *at the time of the unlawful appropriation.*”¹⁷⁷ The court reasoned that “[f]ifteen years [after the date of the patent], when the art has advanced to include other noninfringing machines, available to manufacturers and more effective than those of the prior art, the patentee cannot avoid their competitive effect,” and to make the defendant “pay for the advantages of the invention over the prior art, would attri-

¹⁷⁰ 277 F. at 509.

¹⁷¹ *Id.* at 513.

¹⁷² *Id.* at 511.

¹⁷³ *Id.* at 513.

¹⁷⁴ 194 F. 108, 109–10 (7th Cir. 1911).

¹⁷⁵ *Id.*

¹⁷⁶ *Id.*

¹⁷⁷ *Id.* at 109 (emphasis added).

bute to the patent a virtue it did not really have at the later period."¹⁷⁸

Subsequent cases applied this method of valuation in the context of a hypothetical negotiation. For example, the court in *Dunkley Co. v. Central California Canneries*¹⁷⁹ relied on *A. Mecky* to hold that the royalty "should be fixed at such a sum as the defendants would probably have consented to pay, rather than dispense with the [infringing] machine."¹⁸⁰ The court explained that the royalty should be determined by "evidence showing the nature of the invention, its utility and advantage"¹⁸¹ over alternatives and that "[t]he royalty should be fixed in the light of the conditions which obtained *when the infringements took place*."¹⁸² Other circuit courts and the Court of Claims—the appellate division of which is a predecessor court to the Federal Circuit¹⁸³—similarly assessed reasonable royalties based on a hypothetical negotiation to determine the value of the asserted patent at the time of first infringement.¹⁸⁴

In *Union Carbide Corp. v. Graver Tank & Manufacturing Co.*,¹⁸⁵ the Seventh Circuit extended this approach in holding that separate royalty rates should be awarded for a single course of infringing conduct, based on differences in the value

¹⁷⁸ *Id.* at 110.

¹⁷⁹ 7 F.2d 972 (9th Cir. 1925).

¹⁸⁰ *Id.* at 976.

¹⁸¹ *Id.* at 977.

¹⁸² *Id.* at 976 (emphasis added).

¹⁸³ See *S. Corp. v. United States*, 690 F.2d 1368 (Fed. Cir. 1982).

¹⁸⁴ See, e.g., *Horvath v. McCord Radiator & Mfg. Co.*, 100 F.2d 326, 335 (6th Cir. 1938), *cert. denied sub nom. Carrier Eng'g Corp. v. Horvath*, 308 U.S. 581 (1939) ("In fixing damages on a royalty basis against an infringer, the sum allowed should be reasonable and that which would be accepted by a prudent licensee who wished to obtain a license but was not so compelled and a prudent patentee, who wished to grant a license but was not so compelled."); *Rockwood v. Gen. Fire Extinguisher Co.*, 37 F.2d 62, 66 (2d Cir. 1930) ("In fixing the measure of damages on a royalty basis against an infringer, it should be based on a sum which is reasonable and indicates a general acquiescence on the part of the prudent purchaser to pay for the increased market value due to the improvement."); *Egry Register Co. v. Standard Register Co.*, 23 F.2d 438, 443 (6th Cir. 1928) ("In fixing a reasonable royalty, the primary inquiry, often complicated by secondary ones, is what the parties would have agreed upon, if both were reasonably trying to reach an agreement."); *Austin-W. Rd. Mach. Co. v. Disc Grader & Plow Co.*, 291 F. 301, 304 (8th Cir. 1923) (holding that a "reasonable royalty" should reflect the "amount a person desiring to manufacture and sell the patented article would, as a business proposition, be willing to pay as a royalty"); *Olsson v. United States*, 25 F. Supp. 495, 499 (Ct. Cl. 1938) ("The question to be determined is, What was the invention worth in the market? What would the parties have taken and paid if the matter had come to an express agreement?" (quoting *Wood v. United States*, 36 Ct. Cl. 418, 426 (Ct. Cl. 1901)).

¹⁸⁵ 282 F.2d 653 (7th Cir. 1960).

of practicing the patent as compared to the noninfringing alternatives available at different periods of time.¹⁸⁶ However, the Federal Circuit has more recently held that, while separate acts of infringement involving “vastly different” products may be accorded separate hypothetical negotiation dates,¹⁸⁷ in cases involving a single course of conduct a single reasonable royalty rate should be assessed based on the date of first infringement.¹⁸⁸

Application of the Doctrine—Doctrinally, the hypothetical negotiation is presumed to occur at or just before the time infringement began.¹⁸⁹ While it is well established that the negotiation may be set prior to the earliest infringement at issue in a particular case (for example, in cases where the patent holder cannot seek damages for the initial acts of infringement because of the statute of limitations or other bars to recovery),¹⁹⁰ it is not clear what the relevant date should be.¹⁹¹ Courts have variously used the date of the first infringing use,¹⁹² the first infringing sale,¹⁹³ the first infringing manufacture,¹⁹⁴ and the design and testing of the infringing product.¹⁹⁵ The FTC has suggested, on policy grounds, that the date the infringer first *contemplated* infringement should be used in-

¹⁸⁶ *Id.* at 678.

¹⁸⁷ *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 435 F.3d 1356, 1362 (Fed. Cir. 2006) (emphasis omitted). The court indicated that separate products that are identical with respect to infringement issues could constitute the “same infringement” for purposes of setting a single hypothetical negotiation date. *See id.* at 1362–64.

¹⁸⁸ *LaserDynamics, Inc. v. Quanta Comput., Inc.*, 694 F.3d 51, 76 (Fed. Cir. 2012) (“[I]n each case there should be only a single hypothetical negotiation date, not separate dates for separate acts of infringement . . .”).

¹⁸⁹ *See VirnetX, Inc. v. Cisco Sys.*, 767 F.3d 1308, 1326 (Fed. Cir. 2014) (quoting *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324 (Fed. Cir. 2009)); *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1579 (Fed. Cir. 1996); *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554 (Fed. Cir. 1995) (en banc). *But see infra* note 219 and accompanying text (discussing authorities holding that, in the case of a standard-essential patent, the hypothetical negotiation should be set at the time the patent became essential to the standard).

¹⁹⁰ *See, e.g., LaserDynamics*, 694 F.3d at 76 (holding that the hypothetical negotiation should not be set at the date when the induced infringement began (i.e., when the defendant first learned of the patent), but when the underlying acts of direct infringement by others began three years earlier); *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 870 (Fed. Cir. 1993).

¹⁹¹ *Jarosch & Chapman*, *supra* note 9, at 804.

¹⁹² *Oracle Am., Inc. v. Google Inc.*, 798 F. Supp. 2d 1111, 1116 (N.D. Cal. 2011).

¹⁹³ *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 435 F.3d 1356, 1361 (Fed. Cir. 2006).

¹⁹⁴ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1123 (S.D.N.Y. 1970).

¹⁹⁵ *Oracle*, 798 F. Supp. 2d at 1116.

stead.¹⁹⁶ What is clear, however, is that the date is set in many cases after the infringer has taken steps that have caused it to be locked in to the patented technology.¹⁹⁷

Most IT products, for example, require extensive vertical and horizontal integration of complements and components. Individual devices (such as cellular telephones or laptop computers) are comprised of thousands of separate components that must be configured to interoperate, and the larger devices similarly must be configured to interoperate with external devices (cellular towers, wireless networks, etc.).¹⁹⁸ Software must work with hardware, client devices with servers, storage devices with readers, and so on.

Anticipating these coordination requirements, a manufacturer might take substantial steps to arrange for complements and components even before it completes the testing and manufacture, or even the detailed design, of the infringing product. Manufacturers can thus be effectively locked in to numerous technologies long before any actual acts of infringement.

The hypothetical negotiation date should be set at just prior to the time that the infringer became committed to using the infringing technology, which in most cases will be the lock-in date. Consistent with traditional doctrine,¹⁹⁹ this provides the optimal framework for assessing the incremental benefit conferred by the claimed technology as compared to available alternatives. Setting the hypothetical negotiation at a later date may allow the patent holder to extract a lock-in premium.²⁰⁰ But as explained above, current law remains unsettled with respect to the "first infringement" that determines the date of the hypothetical negotiation and can thus result in the

¹⁹⁶ FED. TRADE COMM'N, *supra* note 3, at 22.

¹⁹⁷ See, e.g., *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 870 (Fed. Cir. 1993) (setting hypothetical negotiation at date of first infringement, which was the date that patent issued); *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1158 (6th Cir. 1978) (setting hypothetical negotiation at date of first infringement, which began on date that patent issued, even though defendant had been making and selling products five years before patent issued).

¹⁹⁸ See *Lemley & Shapiro*, *supra* note 4, at 2016.

¹⁹⁹ See *supra* notes 174–84 and accompanying text.

²⁰⁰ In circumstances where infringers make timing decisions unconstrained by lock-in, it might be appropriate to assess different reasonable royalties based on different hypothetical negotiation dates for early movers (who may have assumed greater commercial risk in implementing the infringing technology before it was tested in the marketplace) and late adopters (who may have delayed implementation until the infringing technology was commercially successful). In both cases, however, the royalty should be assessed based on the incremental value of practicing the patent over the next-best alternative available just prior to the time that the infringer committed to the infringing technology.

hypothetical negotiation being set well after lock-in. In this way, too, ex post information may contaminate the reasonable royalty calculation.

B. Litigation Overestimates the Value of the Patent
Relative to Other Components

Reasonable royalty determinations are also inflated simply because they arise out of the litigation process. This is especially so when the patented technology is just a small component of a larger product. When thousands of patents or other inputs are involved in the same device, judges and juries consistently and systematically overemphasize the value of the single patent (or patents) at issue as compared to all the other inputs.²⁰¹

Litigation has two characteristics that drive this outcome. First, trial time is limited, and there simply is not enough of it to fully explore all of the other technologies and inputs that add value to a product.²⁰² It takes significant time to explain any single technology and its benefits. Thus, the fact-finder hears a great deal about the benefits of the patents-in-suit from the patent holder but, for lack of time, much less about the value of the myriad other technologies and other inputs in the infringing product.²⁰³ The fact-finder thus naturally tends to overvalue the former's contribution.

Second, research by psychologists shows that an individual's judgments are heavily biased toward the "anchor" on which he or she initially focused.²⁰⁴ In virtually every patent

²⁰¹ Lemley & Melamed, *supra* note 9, at 2148. Patent holders understand this and thus often refuse to license component manufacturers that infringe their patents, so that they can instead assert their patents against manufacturers of more valuable downstream products whose value reflects the combination of additional inputs other than the patented technology. These patent holders make that choice even though refusing to license component manufacturers and asserting patents instead against manufacturers of downstream product generally increases transaction costs and enables a larger portion of the infringing products to escape having to pay for use of the patented technology. See *Prepared Statement for the Record of Intel Corporation for the S. Comm. on the Judiciary, Subcomm. on Antitrust, Competition Policy and Consumer Rights on Standard Essential Patent Disputes and Antitrust Law*, 113th Cong. (2013) (statement of A. Douglas Melamed, Senior Vice President and General Counsel, Intel Corp.).

²⁰² Lemley & Melamed, *supra* note 9, at 2148.

²⁰³ *Id.*

²⁰⁴ See, e.g., Gretchen B. Chapman & Brian H. Bornstein, *The More You Ask for, the More You Get: Anchoring in Personal Injury Verdicts*, 10 APPLIED COGNITIVE PSYCHOL. 519, 533–38 (1996) (noting anchoring effects on causality judgments, compensation awards, and litigant perceptions in juror simulations); Gretchen B. Chapman & Eric J. Johnson, *Incorporating the Irrelevant: Anchors in Judgments of Belief and Value*, in HEURISTICS AND BIASES: THE PSYCHOLOGY OF INTUITIVE JUDGMENT

case, this will be the patents-in-suit. This too suggests that the patented technologies are likely to be systematically overvalued at trial, particularly in the common scenario where the patent holder—in an effort to invoke the “entire market value rule”—asserts that the patent-practicing component or feature provides the basis for the market demand for the accused product.²⁰⁵

C. The Special Case of Standard-Essential Patents

To this point, we have discussed ways in which our current system’s approach to addressing perceived undercompensation of infringed patents tends to ignore the now-pervasive practice of overcompensating patent holders. In one area of patent litigation, however, courts *have* noticed the risk of systemic ex post overcompensation and have tried—at least in part—to limit royalties to an ex ante valuation: patents that must be practiced in order to comply with industry-wide standards, referred to as “standard-essential patents” (SEPs).²⁰⁶

A standard-setting organization (SSO) is an organization that develops and promulgates technical standards, most often to facilitate compatibility and interoperability within a particular technical area.²⁰⁷ The standards embody industry-wide so-

120, 120–21 (Thomas Gilovich, Dale Griffin & Daniel Kahneman eds., 2002) (collecting empirical studies demonstrating the anchoring effect); Birte Englich, Thomas Mussweiler & Fritz Strack, *The Last Word in Court—A Hidden Disadvantage for the Defense*, 29 L. & HUM. BEHAV. 705, 706–08 (2005) (discussing anchoring).

²⁰⁵ Under current doctrine, the reasonable royalty rate is generally applied to a royalty base that consists of the revenues attributable to no more than the smallest saleable patent-practicing unit, rather than all of the revenues attributable to the infringing product. And, for a patent that represents a portion of the value of the smallest saleable unit, further apportionment to reflect the value of the patent is required. See, e.g., *VirnetX, Inc. v. Cisco Sys.*, 767 F.3d 1308, 1327 (Fed. Cir. 2014) (“Where the smallest salable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature . . . , the patentee must do more to estimate what portion of the value of that product is attributable to the patented technology.”); cf. *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1232–33 (Fed. Cir. 2014) (“Just as we apportion damages for a patent that covers a small part of a device, we must also apportion damages for SEPs that cover only a small part of a standard.”). However, in cases where the infringing feature is responsible for the consumer demand for the product, the “entire market value rule” permits the total product revenues to be used as the royalty base. See, e.g., *VirnetX*, 767 F.3d at 1326.

²⁰⁶ See *infra* notes 218–20 and accompanying text.

²⁰⁷ See, e.g., FED. TRADE COMM’N, *supra* note 3, at 191 (discussing standard-setting organizations). One example is mobile wireless telephony, an industry where “[i]t is essential that all components involved in this transmission of information be able to communicate seamlessly with one another.” *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 303 (3d Cir. 2007).

lutions to the problems of vertical and horizontal integration discussed in section III.A.3 above, and the solutions usually generate substantial “network effects” as customers and suppliers of components and complements align around the standards.²⁰⁸

Although compliance with these standards is normally voluntary (absent some manner of government or regulatory incorporation),²⁰⁹ once a particular standard is adopted, compliance with it typically becomes a de facto requirement to participate in an industry.²¹⁰ For example, since virtually all wireless laptops are configured to communicate with wireless local area networks using the IEEE 802.11 standard, there is no market for wireless routers that do not comply with that standard.²¹¹

Standardized technology is especially vulnerable to ex post contamination of the reasonable royalty determination because lock-in—that is, the inability as a practical matter of technology users to choose alternative technologies—usually precedes infringement. Once an SSO adopts a standard, the costs associated with modifying the standard in order to design around SEPs are often substantial.²¹² Lock-in thus frequently occurs before technology users in the industry have taken any steps toward using the patented technology. In this case, however, the lock-in is not a consequence of product development and implementation costs incurred by technology users. It is instead a consequence of the enormous group coordination and decision-making costs that the SSO and its members have incurred to develop and adopt the standard, and that would have to be incurred again to change or replace it.²¹³

SSOs are mindful of the lock-in effects of their decisions to include particular technologies in their standards. Thus, most SSOs require their members to commit to license any SEPs they hold on fair, reasonable, and nondiscriminatory (FRAND)

²⁰⁸ See generally Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424, 424–26 (1985) (discussing the network effects of industry-wide standards adoption).

²⁰⁹ Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents*, 28 BERKELEY TECH. L.J. 1135, 1142 (2013).

²¹⁰ See Mark R. Patterson, *Inventions, Industry Standards, and Intellectual Property*, 17 BERKELEY TECH. L.J. 1043, 1073 (2002) (discussing the increased consumer demand for products that meet industry-wide standards).

²¹¹ *Id.*

²¹² See, e.g., FED. TRADE COMM’N, *supra* note 3, at 191.

²¹³ See Lemley & Shapiro, *supra* note 4, at 2016.

terms.²¹⁴ SSOs typically do not specify, however, the proper method for assessing a FRAND royalty rate.²¹⁵ Courts have struggled to make such calculations, and no two courts have taken the same approach.²¹⁶

Although the law is far from settled, courts generally show concern about *overcompensating* standard-essential patent holders. Most notably, the Federal Circuit recently flagged excessive royalties from hold-up by holders of SEPs (because infringers are locked in) and royalty stacking (because of the large numbers of patents involved in standard-compliant products) as “potential problems” in its 2014 decision in *Ericsson, Inc. v. D-Link Systems, Inc.*²¹⁷ Similarly, both the *Ericsson* court and various other courts have determined that patent holders should not capture the increase in value attributable to the inclusion of the technologies claimed by their patents in a standard (with the resulting lock-in and network effects), and that they are entitled instead to only the value of the patented technology relative to the next-best alternative before the SSO decided to include the technology in the standard.²¹⁸ Thus, at

²¹⁴ Jay P. Kesan & Carol M. Hayes, *FRAND's Forever: Standards, Patent Transfers, and Licensing Commitments*, 89 IND. L.J. 231, 233–35 (2014).

²¹⁵ *Id.* The IEEE, however, recently adopted new bylaws specifying that a “reasonable rate” for an essential patent should be limited to the value that the claimed functionality contributes to the smallest saleable unit that practices the claimed invention and must exclude any value resulting from the inclusion of the patent in the standard. See IEEE-SA Standards Board Bylaws, Approved Clause 6 (2015), <http://standards.ieee.org/develop/policies/bylaws/approved-changes.pdf> [<http://perma.cc/YY3U-4FPV>].

²¹⁶ *Compare* *Microsoft Corp. v. Motorola, Inc.*, No. C10–1823JLR, 2013 WL 2111217, at *53 (W.D. Wash. Apr. 25, 2013) (holding that in a hypothetical negotiation, parties would be skeptical about a patent’s relevance to the standard), *with In re Innovatio IP Ventures, LLC*, No. 11 C 9308, 2013 WL 5593609, at *7 (N.D. Ill. Oct. 3, 2013) (holding that the hypothetical negotiators were presumed to know that the patents were essential to the standard). See also Anne Layne-Farrar & Koren W. Wong-Ervin, *Methodologies for Calculating FRAND Damages: Part 2*, LAW360 (Oct. 9, 2014, 10:18 AM) (discussing the different methodologies applied by different courts), <http://www.law360.com/articles/584909/methodologies-for-calculating-frand-damages-part-2> [<http://perma.cc/CG2M-8BLQ>]; A. Douglas Melamed, Remarks at The Intersection of Competition Policy and Patent Policy: Implications for Promoting Innovation Conference 235 (May 26, 2010), http://www.ftc.gov/sites/default/files/documents/public_events/evolving-ip-marketplace/transcript-2.pdf [<http://perma.cc/Rf2Q-XSH3>] (“[E]ven for those who participate in [SSO proceedings and] declared patents, we don’t know what the FRAND terms will actually end up being . . .”).

²¹⁷ 773 F.3d 1201, 1209 (Fed. Cir. 2014).

²¹⁸ See *id.* at 1233 (“Because SEP holders should only be compensated for the added benefit of their inventions, the jury must be told to differentiate the added benefit from any value the innovation gains because it has become standard essential.”); *Microsoft Corp. v. Motorola, Inc.*, 696 F.3d 872, 876 (9th Cir. 2012) (“[S]tandards threaten to endow holders of standard-essential patents with disproportionate market power. In theory, once a standard has gained such wide-

least one court has deemed the date of the hypothetical negotiation to be the date on which the patent became essential to the standard, rather than the date of first infringement.²¹⁹

The concern of these courts is appropriate. It reflects a recognition that, once the patented technology is written into the standard, firms may have no realistic choice but to use it.²²⁰ It also presumably reflects an implicit recognition that the paradigmatic story does not apply and that the infringer cannot be presumed to be the guilty party.²²¹ The FRAND

spread acceptance that compliance is effectively required to compete in a particular market, anyone holding a standard-essential patent could extract unreasonably high royalties from suppliers of standard-compliant products and services. This problem is a form of 'patent holdup.'"); *Open Text S.A. v. Box, Inc.*, No. 13-cv-04910-JD, 2015 WL 349197, at *1 (N.D. Cal. Jan. 23, 2015) ("When the accused technology does not make up the whole of the accused products, and the patented feature does not drive the demand for the entire product, 'the ultimate combination of royalty base and royalty rate must reflect the value attributable to the infringing features of the product, and no more.'" (quoting *Ericsson*, 773 F.3d at 1226)); *SK Hynix Inc. v. Rambus Inc.*, No. C-00-20905 RMW, 2013 WL 1915865, at *19 (N.D. Cal. May 8, 2013) ("Once compliance with a particular standard is effectively required to compete in a particular market, the patentee gains disproportionate bargaining power and may 'extract unreasonably high royalties from suppliers of standard-compliant products and services.' Requiring that the patent be licensed to all on FRAND terms prevents this type of patent 'hold-up.'" (quoting *Microsoft*, 696 F.3d at 876; *Apple, Inc. v. Motorola, Inc.*, 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012))).

²¹⁹ See, e.g., *Apple, Inc.*, 869 F. Supp. 2d at 913 (Posner, J., sitting by designation) ("The proper method of computing a FRAND royalty starts with what the cost to the licensee would have been of obtaining, just before the patented invention was declared essential to compliance with the industry standard, a license for the function performed by the patent."), *aff'd in part, rev'd in part*, 757 F.3d 1286 (Fed. Cir. 2014); see also FED. TRADE COMM'N, *supra* note 3, at 194 ("A definition of [F]RAND based on the ex ante value of the patented technology at the time the standard is set is necessary for consumers to benefit from competition among technologies to be incorporated into the standard—competition that the standard setting process itself otherwise displaces. . . . Courts should cap the royalty at the incremental value of the patented technology over alternatives available at the time the standard was defined."); Josh Lerner & Jean Tirole, *Standard-Essential Patents 2* (Toulouse School of Economics, Working Paper No. IDEI-803, 2014), http://idei.fr/doc/wp/2014/wp_idei_803_v3.pdf [<http://perma.cc/EEH9-A5LU>]; Mark A. Lemley, Remarks at the Evolving IP Marketplace Conference 182 (May 5, 2009), http://www.ftc.gov/sites/default/files/documents/public_events/evolving-ip-marketplace/090505transcript.pdf [<http://perma.cc/CUD6-K9SP>] (stating that such placement could "solve a lot of the hold-up component of damages problems in multi-component industries").

²²⁰ See FED. TRADE COMM'N, *supra* note 3, at 191–92 ("[O]nce a particular patented technology is incorporated in a standard, its adoption eliminates alternatives. At that point, a firm with a patent reading on the standard may have market power in the relevant technology market. If so, the patentee can demand a royalty that reflects not only the ex ante value of the technology compared to alternatives, but also the value associated with investments made to implement the standard." (footnote omitted)).

²²¹ See Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CAL. L. REV. 1889, 1924 (2002) ("If an IP owner agrees to license its

commitment means that the patent holder no longer has a right, presumed in the paradigmatic story, to refuse to license its patent; by the same token, the infringer is entitled to use the patented technology and does not need to obtain the consent of a recalcitrant or mercenary patent holder in order to do so.²²²

While courts have shown heightened concern in the SEP context, they have struggled to synthesize the goal of avoiding overcompensation with the perceived need to consider various *Georgia-Pacific* factors that, rooted in the “paradigmatic story” of patent infringement, take into account ex post developments that inflate the “reasonable royalty” rate.²²³ The Federal Circuit recognized this tension in the *Ericsson* case: the court stated that “many of the *Georgia-Pacific* factors simply are not relevant; many are even contrary to RAND principles” and held that it was reversible error to instruct a jury on those *Georgia-Pacific* factors.²²⁴ The court singled out Factor 8, with its accounting for an invention’s “current popularity,” as being especially out of sync with FRAND royalty adjudication.²²⁵ While the Federal Circuit did not go so far as to set forth a “modified” version of the *Georgia-Pacific* factors for use in the SEP context, it did instruct district courts to adapt the factors “on a case-by-case basis depending on the technology at issue.”²²⁶

Although it is too soon to determine the full impact of *Ericsson*, it seems clear that, even in the FRAND context, ex post contamination and overcompensation for patent holders re-

patents that cover a standard on reasonable and nondiscriminatory terms, others will assume that they are free to use that standard so long as they pay a reasonable royalty. There may be no express license between the IP owner and any of the users of the standard, but it seems perfectly reasonable to imply one from the conduct of the IP owner.”).

²²² In Hohfeldian terms, a FRAND commitment functions as “an irrevocable license [that] creates a use privilege with which the patent owner has no right to interfere, and . . . bestows on the standard adopter a right to negotiate [a reasonable license fee] that the patent owner has a duty to recognize.” Kesan & Hayes, *supra* note 214, at 290–01; see generally Wesley Newcomb Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 YALE L.J. 16 (1913) (setting forth Hohfeld’s original framework defining and establishing the relationships between various legal concepts).

²²³ Layne-Farrar & Wong-Ervin, *supra* note 216; see also *Golden Bridge Tech. v. Apple Inc.*, No. 5:12-cv-04882-PSG, 2014 WL 2194501, at *4 n.51 (N.D. Cal. May 18, 2014) (collecting cases in which courts relied on modified *Georgia-Pacific* factors); *Apple, Inc.*, 869 F. Supp. 2d at 911 (refusing to apply *Georgia-Pacific* factors because of ambiguity).

²²⁴ *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1230–31 (Fed. Cir. 2014).

²²⁵ *Id.* (distinguishing as irrelevant and/or misleading Factors 9 and 10 in the FRAND context).

²²⁶ *Id.* at 1231.

main a serious concern.²²⁷ For example, *Ericsson* did not rule out the admissibility and consideration of ex post licenses. And so long as *Georgia-Pacific* (even subject to modification) persists as the default guiding framework, determinations of reasonable royalties for SEPs are likely to be based on inconsistent, ad hoc methodologies that fail to limit a “reasonable royalty” to the incremental benefit provided by the patent itself.²²⁸

D. Current Law Relating to Future Remedies Overcompensates Patent Holders

1. Ongoing Royalties Overcompensate Patent Holders

Yet another avenue for ex post contamination is the emerging doctrine concerning royalties for posttrial infringement. As discussed in section I.B.2 above, the Federal Circuit’s *Paice* and *Amado* decisions held that courts may assess ongoing royalty rates that are greater than the reasonable royalties assessed for presuit infringement, and these postverdict rates may take into account ex post developments. The resulting law is likely to lead to excessive royalties for two reasons.

First, the rationale for distinguishing between pre- and postverdict “reasonable royalty” rates makes little sense. It is black-letter law that the preverdict hypothetical ex ante negotiation presumes the patent to be both valid and infringed.²²⁹ Jury findings of validity and infringement, therefore, provide no basis for increasing the postverdict rate.²³⁰ The erroneous view that such findings should lead to a forward-looking royalty rate

²²⁷ See, e.g., *Microsoft Corp. v. Motorola, Inc.*, 795 F.3d 1024, 1041 (9th Cir. 2015) (approving district court’s partial consideration of patents’ “present-day value” in setting FRAND royalty rate); see also Layne-Farrar & Wong-Ervin, *supra* note 216 (“Thus far, courts have favored modified versions of the *Georgia-Pacific* factors to recreate a hypothetical negotiation between the parties as the best starting point for FRAND assessments.”).

²²⁸ See, e.g., *Microsoft Corp.*, 795 F.3d at 1041 (approving district court’s method of setting a FRAND royalty rate, including its modification of the *Georgia-Pacific* factors and its consideration of patents’ “present-day value”); *Realtek Semiconductor Corp. v. LSI Corp.*, No. C-12-03451-RMW, 2014 WL 46997, at *7 (N.D. Cal. Jan. 6, 2014) (permitting evidence and argument regarding appropriate FRAND royalty rate based on consideration of third-party licenses to various portfolios that encompassed patents in addition to the patents-in-suit).

²²⁹ See *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1325 (Fed. Cir. 2009). District courts have also taken notice of this tension. See *Univ. of Pittsburgh v. Varian Med. Sys.*, No. 08-cv-1307, 2012 WL 1436569, at *11 (W.D. Pa. Apr. 25, 2012), *aff’d in part, vacated in part*, 561 F. App’x 934 (Fed. Cir. 2014) (“The jury was instructed to assume, for purposes of the damages portion of the trial, that the . . . patent was valid and was being infringed . . .”).

²³⁰ Mark A. Lemley, *The Ongoing Confusion over Ongoing Royalties*, 76 Mo. L. REV. 695, 704 (2011) [hereinafter Lemley, *The Ongoing Confusion*].

greater than the reasonable royalty for past infringement leads to overcompensation of patent holders.²³¹

Second, the *Amado* factors instruct courts to consider the parties' *posttrial* economic circumstances in setting the new royalty rate. This is an invitation to take the defendants' lock-in costs into account and to award the patent holder a premium based upon them.²³²

Since *Amado*, dozens of district courts have awarded ongoing royalties much larger (in some cases, many times larger) than the preverdict royalties.²³³ A few trial courts, however, appear to have recognized the doctrinal inconsistency and have pushed back against further inflation of the royalty rate.²³⁴

2. *The Threat of an Injunction or Exclusion Order Can Lead to Overcompensation for Patent Holders*

The threat of an injunction (or similar prohibition against infringement) is yet another avenue by which negotiated licenses overcompensate patent holders. As a remedy, injunctions are—in most circumstances—very costly to the defendant.²³⁵ In some cases, an injunction may order an infringer to stop selling or importing a particular product, in

²³¹ Although it arguably contravenes the Seventh Amendment's right to a jury trial on patent damages for the judge to reevaluate the hypothetical negotiation to set an ongoing royalty, courts effectively treat ongoing royalties as a form of injunctive relief. See *Paice LLC v. Toyota Motor Corp.*, 504 F.3d 1293, 1315–16 (Fed. Cir. 2007).

²³² See *Amado v. Microsoft Corp.*, 517 F.3d 1353, 1362 n.2 (Fed. Cir. 2008) (suggesting that the preverdict reasonable royalty of \$0.04 should be the floor and the \$2.00 that plaintiff was requesting should be the ceiling for setting ongoing royalties on remand); Lemley, *The Ongoing Confusion*, *supra* note 230, at 703–04.

²³³ See, e.g., *Bos. Sci. Corp. v. Cordis Corp.*, 838 F. Supp. 2d 259, 265, 282 (D. Del. 2012) (ordering ongoing royalty rate over ten times jury's original rate); *Joyal Prods., Inc. v. Johnson Elec. N. Am., Inc.*, No. 04-5172 (JAP), 2009 WL 512156, at *13 (D.N.J. Feb. 27, 2009) (ordering ongoing royalty rate 4.5 times jury's original rate).

²³⁴ See, e.g., *WBIP, LLC v. Kohler Co.*, No. 11-cv-10374-NMG, 2014 WL 585854, at *9 (D. Mass. Feb. 12, 2014) (determining that *Paice* “does not foreclose setting an identical rate to that found by the jury” and according the jury's rate “considerable deference”); *Orion IP, LLC v. Mercedes-Benz USA, LLC*, No. 6:05 CV 322, 2008 WL 8856865, at *5 (E.D. Tex. Mar. 28, 2008) (“Orion has not shown how the situation now is any different than that presented at trial, which justified the two percent royalty rate. Accordingly, two percent remains an appropriate royalty rate for postverdict infringement.”).

²³⁵ Lemley & Shapiro, *supra* note 4, at 1992–93 (“Injunction threats often involve a strong element of *holdup* in the common circumstance in which the defendant has already invested heavily to design, manufacture, market, and sell the product with the allegedly infringing feature. . . . [T]he threat of an injunction can enable a patent holder to negotiate royalties far in excess of the patent holder's true economic contribution.”). An injunction may prohibit a party from engaging in behavior that it has already ceased or can cease promptly with limited

which case the infringer would either have to bear the lock-in costs or lose its investment and the prospect of future profits from the enjoined business.²³⁶ Even when an injunction prohibits the infringer only from employing a single component or feature, it may be onerous for the infringer to separate the infringing instrumentality from the noninfringing ones.²³⁷

As discussed above, the Supreme Court's *eBay* decision reset the table for permanent injunctions—particularly for nonpracticing entities.²³⁸ In the years following *eBay*, district courts began denying permanent injunctions with increasing frequency, and the Federal Circuit has generally affirmed those decisions.²³⁹ But even with these developments, uncertainties remain. Injunctions may still be available in cases brought by practicing entities (particularly market competitors)²⁴⁰ even post-*eBay*, courts have awarded some nonpracticing entities permanent injunctions.²⁴¹

repercussions, in which case the injunction imposes minimal costs as a practical matter.

²³⁶ *Id.* at 2009 (“[P]atentees regularly settle with companies in the information technology industries for far more money than their inventions are actually worth. These companies are paying holdup money to avoid the threat of infringement. That is not a legitimate part of the value of a patent; it is a windfall to the patent owner . . .”).

²³⁷ See, e.g., *Funai Elec. Co. v. Daewoo Elecs. Corp.*, 593 F. Supp. 2d 1088, 1093 (N.D. Cal. 2009), *aff'd*, 616 F.3d 1357 (Fed. Cir. 2010) (granting injunction against seller of VCRs to holder of patent for “Loading Mechanism for a Video Cassette”); see also Lemley & Shapiro, *supra* note 4, at 2010 (explaining that infringers are often unable to “separate the infringing component from the noninfringing ones after the fact”).

²³⁸ In the first year after *eBay*, courts awarded no injunctions in the four cases involving nonpracticing patent holders. Eric Keller, *Time-Varying Compulsory License: Facilitating License Negotiation for Efficient Post-Verdict Patent Infringement*, 16 TEX. INTELL. PROP. L.J. 427, 434 tbl.1 (2008).

²³⁹ See *Post-eBay Permanent Injunction Rulings by District Courts*, PAT-STATS.ORG, http://www.patstats.org/Injunction_rulings_post-eBay_to_12-31-2013.xls [<http://perma.cc/N67Y-TT3B>] (cataloging district court cases through 2013); Ernest Grumbles, III, Rachel C. Hughey & Susan Perera, *The Three Year Anniversary of eBay v. MercExchange: A Statistical Analysis of Permanent Injunctions*, INTELL. PROP. TODAY (2009), <http://www.iptoday.com/issues/2009/11/articles/three-year-anniversary-eBay-MercExchange.asp> [<http://perma.cc/ZYR2-E3WS>].

²⁴⁰ See, e.g., *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1339 (Fed. Cir. 2013) (affirming district court's grant of permanent injunction where the parties were direct competitors).

²⁴¹ See, e.g., *Joyal Prods. v. Johnson Elec. N. Am., Inc.*, No. 04-5172 (JAP), 2009 WL 512156, at *11 (D.N.J. Feb. 27, 2009) (granting injunction to company that previously practiced but had since ceased operations and sought to sell the patent); *CSIRO v. Buffalo Tech. Inc.*, 492 F. Supp. 2d 600, 608 (E.D. Tex. 2007) (granting injunction to the Australian Federal Government's principal scientific research organization).

Moreover, because of the additional leverage that the threat of an injunction provides, nonpracticing entities—fully aware of the impact of *eBay*—have altered their strategic behavior, most notably by bringing an increasing number of patent infringement claims to the International Trade Commission (ITC).²⁴² Under Section 337 of the Tariff Act of 1930, the ITC may issue an exclusion order barring the importation of goods that infringe U.S. intellectual property rights,²⁴³ and *eBay*'s four-factor test does not apply to ITC exclusion orders.²⁴⁴ Although a patent holder must satisfy the ITC's "domestic industry" requirement in order to bring a section 337 complaint,²⁴⁵ the Federal Circuit has found that nonpracticing entities may meet this requirement through licensing and litigation activities.²⁴⁶ The statute provides, somewhat cryptically, that the

²⁴² See K. William Watson, *Still a Protectionist Trade Remedy: The Case for Repealing Section 337*, 708 POL'Y ANALYSIS 1, 5 (Sept. 19, 2012) (linking an increase in ITC cases to an influx of cases brought by nonpracticing entities); Timothy B. Lee, *ITC: How an Obscure Bureaucracy Makes the World Safe for Patent Trolls*, ARS TECHNICA (Sept. 21, 2012, 1:15 PM), <http://arstechnica.com/tech-policy/2012/09/itc-how-an-obscure-bureaucracy-makes-the-world-safe-for-patent-trolls/> [<http://perma.cc/AB5P-CXHQ>].

²⁴³ See 19 U.S.C. § 1337(a)(1)(B)(i), (a)(2), (d) (2012). The ITC may not award damages. *Id.* § 1337(d)–(f).

²⁴⁴ *Spansion, Inc. v. Int'l Trade Comm'n*, 629 F.3d 1331, 1359 (Fed. Cir. 2010). In June 2013, the White House, as part of its efforts to address "frivolous [patent] litigation," recommended that Congress "[c]hange the ITC standard for obtaining an injunction to better align it with the traditional four-factor test in *eBay Inc. v. MercExchange*, to enhance consistency in the standards applied at the ITC and district courts." Office of the Press Secretary, *Fact Sheet: White House Task Force on High-Tech Patent Issues*, WHITE HOUSE (June 4, 2013), <http://www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-task-force-high-tech-patent-issues> [<http://perma.cc/Z6YF-LPN7>] (emphasis omitted).

²⁴⁵ See 19 U.S.C. § 1337(a)(2)–(3). The statute provides that the ITC should not issue an exclusion order if it concludes, "after considering the effect of such exclusion upon the public health and welfare, competitive conditions in the United States economy, . . . [and] consumers," that the infringing "articles should not be excluded," *id.* § 1337(d)(1), but the ITC has not construed this provision to provide a basis for declining to issue an exclusion order to an NPE.

²⁴⁶ See *InterDigital Commc'ns, LLC v. Int'l Trade Comm'n*, 707 F.3d 1295, 1304 (Fed. Cir. 2013) ("[A]s long as the party seeking relief can show that it has a sufficiently substantial investment in the exploitation of the intellectual property to satisfy the domestic industry requirement of the statute, that party is entitled to seek relief under section 337."). To satisfy the domestic industry requirement, however, a patent holder must direct licensing or litigation efforts at "encourag[ing] the] adoption and development of articles that incorporated [the patent holder's] patented technology." *Motiva, LLC v. Int'l Trade Comm'n*, 716 F.3d 596, 600–01 (Fed. Cir. 2013); see also *John Mezzalingua Assocs., Inc. v. Int'l Trade Comm'n*, 660 F.3d 1322, 1328–30 (Fed. Cir. 2011) (finding that a patent holder failed to meet the domestic industry requirement where it had not engaged in prelitigation licensing or offered to license the patent to any party other than its litigation opponents).

ITC “shall” issue an exclusion order “unless” it finds that the infringing articles “should not be excluded” after considering “the effect of such exclusion upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers.”²⁴⁷ The ITC has never declined to issue an exclusion order because the infringed patent is an SEP or because the patent holder is a nonpracticing entity.²⁴⁸

Both an exclusion order and an injunction can impose potentially devastating costs on a firm.²⁴⁹ Infringers are thus likely to agree to pay more in royalties in an ex post license than the value of the patented technology in order to avoid even a small risk of an injunction or exclusion order.²⁵⁰ The prospect of the resulting inflated royalties encourages “lie-in-wait behavior” on the part of patent holders, who recognize that they may be able to obtain significantly greater license fees after infringement is underway and the infringer is locked in.²⁵¹

²⁴⁷ 19 U.S.C. § 1337(d)(1).

²⁴⁸ All ITC exclusion orders, however, are subject to the approval or disapproval of the President, and the U.S. Trade Representative, Ambassador Froman, has stated that any such orders based on standard-essential patents will be subject to particular scrutiny. Letter from Michael B.G. Froman, Ambassador, Office of the U.S. Trade Representative, to the Honorable Irving A. Williamson, Chairman, U.S. Int’l Trade Comm’n (Aug. 3, 2013) (on file with author). Most notably, in *Certain Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers*, the ITC issued an exclusion order with respect to several Apple products found to infringe an allegedly standard-essential patent. 78 Fed. Reg. 34,669 (U.S. Int’l Trade Comm’n June 10, 2013). Ambassador Froman explained that, due to the potential for patent hold-up, exclusions based on standard-essential patents pose a particular risk of harming the public interest. He then disapproved the ITC order—the first time that any Administration had done so in over twenty-five years. Letter from Froman, *supra* note 248, at 3; *see also* Brian X. Chen, *Obama Administration Overturns Ban on Apple Products*, N.Y. TIMES: BITS (Aug. 3, 2013, 4:23 PM), <http://bits.blogs.nytimes.com/2013/08/03/obama-administration-overturns-ban-on-apple-products/> [<http://perma.cc/V2S3-LPE7>].

²⁴⁹ For example, in *NTP, Inc. v. Research in Motion, Ltd.*, No. Civ.A. 3:01CV767, 2003 WL 23100881 (E.D. Va. Aug. 5, 2003), after the jury awarded about \$33.5 million in damages and the court ordered an injunction, the parties settled for \$612.5 million. *See* Mark Heinzl & Amol Sharma, *RIM to Pay NTP \$612.5 Million to Settle BlackBerry Patent Suit*, WALL ST. J.: GETTING THE MESSAGE (Mar. 4, 2006, 12:01 AM), <http://www.wsj.com/articles/SB114142276287788965> [<http://perma.cc/YLY5-T3RY>].

²⁵⁰ *See* Heinzl & Sharma, *supra* note 249; *see also* FED. TRADE COMM’N, *supra* note 3, at 226 (“Hold-up gives the patentee more compensation than it could have earned through competition in the technology market.”); Morton & Shapiro, *supra* note 154, at 473 (“Risk averse business executives may be willing to pay significantly higher royalties rather than accept even a small risk of an exclusion order.”).

²⁵¹ FED. TRADE COMM’N, *supra* note 3, at 227.

E. Inflated Litigation Royalties Lead to Inflated Rates for Negotiated Licenses, Which in Turn Feed Back into Future Litigation Royalties

The current reasonable royalty doctrine systematically overcompensates patent holders in damages awards. That is Phase One of the vicious cycle.

Inflated litigation awards, in turn, lead to inflated royalties agreed to in ex post license agreements because, as explained in subpart III.A, parties negotiate those agreements in the shadow of litigation.²⁵² The more the parties anticipate that the patent holder would get from litigation, the more an infringer must and would pay to avoid litigation.²⁵³ In short, inflated litigation royalties lead to inflated negotiated license rates. That is Phase Two of the vicious cycle.

There is also a Phase Three of the feedback loop, in which the inflated license rates feed back into future reasonable royalty calculations in litigation and perpetuate their inflated levels. As discussed above, the first two *Georgia-Pacific* factors bring “comparable licenses” prominently into the reasonable royalty calculation,²⁵⁴ and these factors (especially licenses for the patents-in-suit) are often given great weight in the reasonable royalty analysis.²⁵⁵ But the comparable licenses courts consider under *Georgia-Pacific* are themselves overvalued, in part because of the exaggerated litigation damages from Phase One of the cycle. When these inflated license royalties are

²⁵² *Id.* at 57 (“Ex post licensing negotiations . . . are largely driven by how the parties believe they will fare in infringement litigation, including the size of any potential damages award.”); Lemley & Shapiro, *supra* note 4, at 1992.

²⁵³ This litigation-driven royalty inflation exists also in sectors that do not have a “develop without full preclearance” dynamic, albeit to a lesser degree. Parties also negotiate ex ante licenses in the shadow of litigation because one alternative to taking a license, especially where there is substantial doubt as to whether the contemplated product or process would infringe a valid patent, is to infringe and litigate. The higher the expected litigation damages in that situation, the more a technology user is likely to be willing to agree to a license ex ante.

²⁵⁴ See *supra* subsection III.A.2.a.

²⁵⁵ See, e.g., *Dow Chem. Co. v. Mee Indus., Inc.*, 341 F.3d 1370, 1382, n.4 (Fed. Cir. 2003) (“Prior agreements ‘carry considerable weight in calculating a reasonable royalty rate.’” (quoting *Unisplay, S.A. v. Am. Elec. Sign Co.*, 69 F.3d 512, 519 (Fed. Cir. 1995))); *Unisplay*, 69 F.3d at 519 (holding that reasonable royalty could not exceed rate used in comparable license); *Cequent Trailer Prods., Inc. v. Intradin (Shanghai) Mach. Co.*, No. 1:05-CV-2566, 2007 WL 438140, at *8 (N.D. Ohio Feb. 7, 2007) (“[P]rior and existing licenses for patented technology are the ‘most influential factor’ in determining a reasonable royalty.” (quoting *Mobil Oil Corp. v. Amoco Chems. Corp.*, 915 F. Supp. 1333, 1353 (D. Del. 1994))); cf. *Riles v. Shell Expl. & Prod. Co.*, 298 F.3d 1302, 1313 (Fed. Cir. 2002) (setting aside damage award based on expert’s damages model that did not take established licensing practices into account).

made the basis for future litigation royalties, they perpetuate the excessive damage awards. The inflated premium extracted from one firm drives a litigation outcome for the next firm. Knowing this, patent holders have an incentive to negotiate first with parties least able to litigate or otherwise resist and thus most likely to agree to inflated royalties, and then to use those agreements as benchmarks in later litigation and negotiations. The feedback loop is complete.²⁵⁶

IV

BREAKING THE VICIOUS CYCLE

A. Economic Concepts

1. *Key Incentives*

The patent system has a variety of effects, which create a variety of incentives.²⁵⁷ We focus here on two that are key to determining efficient remedies.

Most important, patent protection is intended to encourage invention and dissemination of new ideas.²⁵⁸ Generally, to the extent patents increase the profits an inventor can realize from an invention, the more incentive the inventor will have to invent. Generous remedies (such as high damages and easy-to-obtain injunctions) increase this incentive; limited remedies reduce it.²⁵⁹ Excessively generous remedies can induce parties to obtain patents as litigation tools beyond their economic value to technology users and consumers.²⁶⁰

A second countervailing incentive is for others to develop new products and to make further innovations building upon

²⁵⁶ Lemley and Shapiro noted many years ago that courts' "reliance on private license deals involves a degree of circularity," but they did not explore the feedback loop implications of that circularity. Lemley & Shapiro, *supra* note 4, at 2021.

²⁵⁷ See *Aronson v. Quick Point Pencil Co.*, 440 U.S. 257, 262 (1979) (explaining that the goals of the patent system are to "foster and reward invention," to promote "disclosure of inventions, to stimulate further innovation . . . [.] to permit the public to practice the invention once the patent expires," and to "assure that ideas in the public domain remain there for the free use of the public"); Roger D. Blair & Thomas F. Cotter, *Rethinking Patent Damages*, 10 TEX. INTELL. PROP. L.J. 1, 45 nn.214–15 (2001) (listing numerous different patent-related incentives that courts have considered).

²⁵⁸ See *Aronson*, 440 U.S. at 262 ("[P]atent law seeks to foster and reward invention.").

²⁵⁹ See FED. TRADE COMM'N, *supra* note 3, at 4 ("Undercompensation can undermine the patent system's incentives to innovate. This could impair investment in R&D and result in fewer new, innovative products and services.").

²⁶⁰ See Lemley & Melamed, *supra* note 9, at 2176 ("The ability of patent holders to extract excessive damages awards . . . adds to the incentives for bottom feeding and litigation abuse.").

earlier inventions.²⁶¹ Before developing and introducing a new product, a firm must consider the potential costs that could arise from future litigation involving the product, such as having to pay damages for patent infringement and the risk of being shut down by an injunction and losing its investment.²⁶² Generous remedies reduce the incentives of others to innovate and develop new products; limited remedies increase it.²⁶³

Where there is a willing licensee and a willing licensor, the optimum patent royalty—to balance the incentive to invent and the incentive to develop—rewards the patent holder with the actual market value of the invention, but no more. If the royalty is less than that, the patentee will have too little incentive to invent. If the royalty is more than that, it will excessively inhibit product development and follow-on innovation.²⁶⁴

The patent infringement remedy that reflects the invention's market value is one that most closely restores the parties to their *ex ante* positions—that is, the position the parties would have been in if they had negotiated a license *ex ante*.²⁶⁵

²⁶¹ See Aronson, 440 U.S. at 262 (finding that one of the purposes of the federal patent system is to “promote[] disclosure of inventions to stimulate further innovation”).

²⁶² See, e.g., Cotter, *supra* note 4, at 313–14 (“[S]upracompensatory awards could have the negative consequence of deterring potential offenders from engaging in marginally lawful or efficient conduct.”).

²⁶³ A substantial body of research suggests that patents do not motivate invention very much, if at all, in some important industries. See, e.g., Andrew W. Torrance & Bill Tomlinson, *Patents and the Regress of Useful Arts*, 10 COLUM. SCI. & TECH. L. REV. 130, 133 n.13 (2009) (citing studies that directly measure technological innovation in a single economy of interest). To the extent these studies are correct, patents would seem to be socially undesirable because they would deter product development and follow-on invention with little or no offsetting benefit in terms of inducing invention. For purposes of this Article, however, we assume that patents do provide an important incentive for invention and address the question of optimal patent remedies given that assumption.

²⁶⁴ Excessive awards to patent holders will also induce parties to obtain patents—not to protect their inventions, but simply as a source of revenue. If we are correct that patent remedies are excessive, that might explain in part the exponentially increasing number of patent applications in recent years. See Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 12–19 (2005). Note that this is not to say all effects of excessive awards would be negative—at least some new and useful inventions would likely result from greater incentives for obtaining patents—but that the marginal result would be a net loss because the benefits that might be derived from such inventions would likely be less than the overall social cost necessary to incentivize them.

²⁶⁵ Some commentators have advocated basing the remedy on the value of the patented technology without regard to any *ex ante* negotiation. See, e.g., Jarosz & Chapman, *supra* note 9, at 811–12 (arguing that the hypothetical negotiation construct should be replaced with an asset valuation approach to calculating reasonable royalty damages); Taylor, *supra* note 114, at 126–32 (advocating for the elimination of the hypothetical negotiation construct in order to emphasize the valuation of patented technology rather than the valuation of patent rights).

This is the remedy the leading cases contemplate, as discussed above.²⁶⁶ Providing this remedy in an individual case requires determining the market value of the patented invention absent infringement and exclusive of factors such as lock-in costs and litigation risks that are separate from the incremental benefit conferred by the patent itself.²⁶⁷

2. Dimensions

The circumstances of patent infringement are more complex than the simple reference to *ex ante* value suggests. For our purposes, we envision a matrix that distinguishes the various circumstances along two dimensions: one reflecting the nature of the infringer, the other reflecting the nature of the patent holder.

a. Innocent vs. Guilty Infringement

Unlike the paradigmatic story, we recognize that infringers are often “innocent” in the sense that they acted *correctly* by not preclearing all potentially relevant patent rights, and that such behavior should be encouraged, not punished.

Infringers are not always innocent in this sense. Specifically, we call an infringer guilty if it could cost-effectively have avoided infringement by negotiating a license *ex ante* but chose instead to infringe. This occurs most often in industries that are not characterized by rapid innovation or those, such as the pharmaceutical industry, in which products or processes entail technologies claimed by a small number of patents.²⁶⁸ This is also more likely to be the case with respect to patents held by competitors because firms are often better able to identify pat-

These approaches should lead to a similar result because, as explained above, the incremental value of the patented technology is the maximum amount the technology user would have agreed to pay in an *ex ante* negotiation. But these approaches would overstate the royalty in at least some cases because, by setting the royalty at that maximum, they would allocate to the patent holder the entire surplus or gain from the licensing transaction. Depending on the bargaining power of the parties, the surplus would in some cases be allocated differently, and the actual market value of the patented technology would be less (and may not be the same in all cases, because the value conferred—and thus the parties’ relative bargaining power—may differ depending on product type, intended use, suitability of alternatives for that use, and other factors that may inform the incremental benefit conferred to a particular technology user).

²⁶⁶ See *supra* section I.A.2.

²⁶⁷ See FED. TRADE COMM’N, *supra* note 3, at 138 (“For remedies to protect the patent system’s incentives to innovate and avoid distorting competition among technologies, they must replicate the reward the patentee would have earned in the market absent infringement.”).

²⁶⁸ See *supra* note 69 and accompanying text.

ents held by other market participants (and indeed, there may be competitive factors that incentivize firms to do so separate from any concerns about potential patent infringement).²⁶⁹

Conversely, we call an infringer innocent if it could not cost-effectively have negotiated a license *ex ante*. This occurs most often in industries characterized by “patent thickets” and rapid innovation and thus the “develop without full preclearance dynamic,”²⁷⁰ although it can also occur if, for example, the infringed patent was not published before the infringer became locked in to the infringing technology. It is also more likely to occur in cases where the patent is held by an NPE rather than a market participant.²⁷¹ Because the infringer is in the best position to know the difficulties it would have faced trying to obtain preclearance *ex ante*, the infringer should bear the burden of persuasion on this issue.

In theory, infringement can be guilty even in “develop without full preclearance” industries if, for example, the infringer actually knew that its product would infringe a particular patent or willfully blinded itself to the likelihood of that infringement by “tak[ing] deliberate actions to avoid learning of that fact.”²⁷² However, even an infringer that has actual knowledge of the infringed patent *ex ante* might be innocent for one of two separate reasons. First, because patents are often ambiguous in scope, it is often difficult to determine whether a proposed product would infringe and whether the patent is likely valid.²⁷³ Second, the sheer multiplicity of patents might make it inefficiently costly for an infringer to negotiate licenses *ex ante* for even the subset of patents that it believes are likely valid and infringed.²⁷⁴

²⁶⁹ See *supra* subpart II.A.

²⁷⁰ See *infra* section IV.B.1.

²⁷¹ See *supra* subpart II.B.

²⁷² *Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S. Ct. 2060, 2070 (2011) (discussing willful blindness in the context of liability for inducing infringement).

²⁷³ See *supra* subpart II.B. Whether it is cost-effective to negotiate *ex ante* may depend in part on the uncertainty about validity and infringement and the strength of the potential claims. A reasonable infringer would be less likely to negotiate a license *ex ante* if the infringement claim is weak.

²⁷⁴ There is a further scenario in which an infringer that had *ex ante* knowledge of the infringed patent might be deemed innocent—if the infringing product has a large number of complementary inputs, whether patented or not, that are designed to work with the patented technology and there is thus no realistic noninfringing way to make the product or a close substitute. In that situation, the risk that the infringer would be deemed to be a guilty infringer would enable even a patent holder that wanted to license the patent to use the threat of an injunction to extract a royalty that reflects the value of other inputs as well as the patented technology. The likelihood of such hold-up might be easier to demonstrate if the

There are, however, two closely related scenarios in which infringement should be regarded as guilty even where it would be unrealistic to expect “full preclearance.” Both cases involve infringement of a patent held by a competitor. In the first case, the technology user infringes the patent knowing (or willfully blinded itself from knowing) that the competitor is at least generally unwilling to license the patent for the infringer’s intended use. In the second case, the infringer copies a product that is sold by a competitor and knows (or willfully blinded itself from knowing) that the competitor’s product depends upon technologies covered by patents owned or exclusively licensed by the competitor.²⁷⁵ In these situations, the infringer should not be able to use its inability to obtain full preclearance as an excuse for not trying to obtain a license from the competitor, who might prefer to prohibit or restrict the use of its patented technologies in competition against it.

It is also possible for an innocent infringer to become at a later time a guilty infringer with respect to later-developed products that bear no relation to the prior infringing products. As discussed above, once a firm becomes locked in to particular technology, it will often be prohibitively expensive to switch to an alternative.²⁷⁶ This lock-in will generally persist through subsequent generations of products to the extent that those later generations rely on the same underlying technology, infrastructure, customer knowledge, supply chain, third-party compatibility, backwards compatibility, and so on. Thus, any infringement with respect to these products will continue to be innocent. But in some circumstances an innocent infringer might not be locked in to, and might be able to cost-effectively negotiate a license with respect to a new, unrelated product that uses the patented technology. That is most likely to be the case if there is no path dependence with respect to the development, production, sale, or use of the later product. In that situation, the infringer might become a guilty infringer with respect to the new product.²⁷⁷

infringer had attempted to negotiate a license in advance, but it should not be required to do so as a matter of law.

²⁷⁵ *Global-Tech* was such a case. The infringer copied a competitor’s product and then intentionally concealed the copying when it sought a noninfringement opinion from an attorney. See *Global-Tech*, 131 S. Ct. at 2060, 2070.

²⁷⁶ See *supra* subpart II.C.

²⁷⁷ Current law embraces a similar approach in the context of *res judicata* and similar preclusion doctrines. For example, the *Kessler* doctrine prevents a patent holder from alleging infringement against products that are “essentially the same” as different products that acquired “noninfringing” status as a result of prior litigation. See, e.g., *Brain Life, LLC v. Elekta Inc.*, 746 F.3d 1045, 1055–58 (Fed.

Determining whether an infringer is innocent or guilty will often be easy. Infringers of SEPs used in standard-compliant products, for example, will almost always be innocent.²⁷⁸ In other cases, such as those described in the preceding paragraph, it might be difficult for courts to make the determination. But efforts by the infringer to manipulate the facts to make it more likely that it will be found to be innocent should be constrained to some extent by the fact that the infringer will have the burden of proof on this issue. Moreover, this is hardly the only difficult factual issue that courts are called upon to resolve in infringement cases, and this issue is similar to those that courts are currently called upon to resolve in deciding whether infringement was willful.²⁷⁹

Cir. 2014). Likewise, the doctrines of claim preclusion and issue preclusion may require a similar result. *See id.* at 1053–55.

²⁷⁸ In most cases, SSOs permit any member to declare that one or more of its patents is essential to the standard without making a determination as to whether any particular patent is actually essential. As a result, knowledge by a standard implementer that a patent has been declared essential to a standard is insufficient to constitute knowledge that the implementer is infringing a valid patent. An implementer is likely to be innocent, in any event, if there is a large number of SEP holders and preclearance with all of them would be inefficient.

The European Union Court of Justice (ECJ) recently suggested a framework for identifying the rare circumstances under which it might find an implementer of a public standard to have engaged in something akin to guilty infringement and thus to merit being enjoined from infringing a FRAND-committed patent. *See* Case C-170/13, *Huawei Techs. Co. v. ZTE Corp.*, 2015 E.C.R. The key to the ECJ's approach is whether the technology user had adequate notice of the alleged infringement and engaged in bad faith conduct in negotiating a FRAND license. Significantly, the ECJ emphasized that the owner of a FRAND-encumbered patent must first, before seeking an injunction, provide the alleged infringer with its particular infringement claims with respect to each allegedly infringed patent as well as its proposed FRAND royalty. *Id.* at ¶¶ 60–64. When those circumstances are met, the ECJ held that it may be appropriate for the patent holder to seek an injunction against an infringer that refuses to respond to a FRAND offer or otherwise engages in bad faith delaying tactics. *Id.* at ¶ 65. The ECJ did not address the impact of lock-in costs or the “develop without full preclearance” dynamic.

It might be appropriate to provide some manner of sanction for properly defined bad faith conduct that follows innocent initial infringement. As explained below, however, an injunction will rarely be appropriate, particularly given that the patent holder's FRAND commitment is an acknowledgement that it is a willing licensor and that a FRAND royalty constitutes adequate compensation for any use of its patents. *Cf.* *Apple, Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1332 (Fed. Cir. 2014), *abrogated in part*, *Williamson v. Citrix Online, LLC*, 792 F.3d 1339 (Fed. Cir. 2015) (explaining that an injunction will rarely be appropriate with respect to a FRAND-encumbered patent because “[a] patentee subject to FRAND commitments may have difficulty establishing irreparable harm,” but noting that it may be justified in cases where an infringer actually or constructively refuses to pay a FRAND royalty). An injunction would often be appropriate if a party refused to pay a court-ordered royalty, but in such a case it would be in aid of the court's authority and not itself a remedy for infringement.

²⁷⁹ *See supra* subpart I.C.

b. *Ex Ante Willing vs. Unwilling Licensor*

We call a patent holder an ex ante “unwilling licensor” if it had a policy of not licensing the patent to the infringer (and perhaps others) for the infringing use as of the lock-in date. Unwilling licensors are generally those who would have wanted, ex ante, to prevent the infringer (and perhaps others like the infringer) from using the patented invention, at least for that use. They include patent holders who wanted to practice the patents exclusively and those who wanted to license a limited number of others to exploit the patent for them. We call a patent holder an ex ante “willing licensor” if it would have intended ex ante to license the patent for the infringing use to the infringer or to some general category of technology users that includes the infringer.²⁸⁰ It might have intended to do so because it wanted to monetize its patents or to use them to obtain a cross-license or some other valuable asset.²⁸¹ The category of willing licensor also includes those who were legally required to license their patents because, for example, they were bound by a FRAND commitment made to an SSO.²⁸²

The patent holder should have the burden of persuasion on this issue. Because the issue turns on whether the patent holder sought to prevent others from using the patented technology ex ante, problems of proof are unlikely to be insuperable—particularly as courts already consider similar concerns in the context of assessing the appropriateness of an injunction under *eBay*.²⁸³

B. Efficient Remedies

These two dimensions can be combined in the following table:

²⁸⁰ One is a “willing licensor” if it intended ex ante to license the patent even if it would not have entered into a license ex ante. In other words, a patent holder cannot avoid being deemed a willing licensor for purposes of our analysis if it intended all along to license the infringer but wanted to wait until the infringer was locked-in in order to negotiate at that time a higher royalty. Conversely, a patent holder is a “willing licensor” only if it is willing to license the patent at a price that is equal to or less than the maximum amount the licensee (or a rational licensee) would have been willing to pay. A patent holder should thus not necessarily be deemed a “willing licensor” just because there is some price at which it would have been willing to license the patent.

²⁸¹ See Kurt M. Saunders, *Patent Nonuse and the Role of Public Interest as a Deterrent to Technology Suppression*, 15 HARV. J.L. & TECH. 389, 391 (2002) (“[A] firm will exploit its patents, even if the firm itself is not using them, by licensing them to other firms.”).

²⁸² See *supra* subpart III.C.

²⁸³ See *supra* section I.B.1.

TABLE 2

	Willing Licensor	Unwilling Licensor
Innocent Infringer	Category I	Category II
Guilty Infringer	Category III	Category IV

In section 1, we discuss remedies when the infringer is innocent (top row). In section 2, we discuss remedies when the infringer is guilty (bottom row). In both instances, we consider the case in which the patent holder is willing to license the patent *ex ante* (left column) and the case in which the patent holder is unwilling to do so (right column).

1. *Innocent Infringement*

Where the “develop without full preclearance” dynamic prevails and it is not cost-effective for firms to negotiate a patent license *ex ante*, remedies law should not attempt to make them do so or punish them if they do not. That would be socially wasteful. In these circumstances, the “paradigmatic story” is simply inapplicable.

a. *Category I: Innocent Infringement with a Willing Licensor*

We begin by addressing Category I: the case in which the infringer is innocent and the patent holder would have been willing to license the patent *ex ante*. Most NPE patent holders are in this category. Licensing is their business, so they are generally willing and eager to grant licenses.²⁸⁴ Others who might willingly license their patents to all comers include some solo inventors and universities, which cannot develop the patented invention themselves, and firms with patents in markets in which they do not themselves compete, patents covering technologies that are likely to account for a small part of the value of the products that utilize them and for which an injunction is therefore unlikely, and patents whose principal value is as barter for cross-licenses. In many cases, these parties are interested in injunctive relief only as leverage to obtain higher license fees.

Economic Characteristics—In innocent infringement/willing licensor cases, courts should strictly limit past damages to the royalty the parties would have negotiated in a genuinely *ex*

²⁸⁴ Lemley & Melamed, *supra* note 9, at 2129 (explaining that NPEs are interested only in monetizing their patents).

ante hypothetical negotiation. This royalty is the best estimate of the true value of the patented invention and represents the optimal tradeoff between inventors' incentives to invent and firms' incentives to develop new products.²⁸⁵

As we have discussed, however, a vicious cycle of overcompensation arises under current damages law in such cases. The law allows consideration of ex post factors such as lock-in costs to inflate litigation royalties; these inflated royalties combine with the risk of injunctive relief to inflate the costs of licenses negotiated in the shadow of litigation; and these inflated license fees, in turn, inflate litigation royalties and perpetuate the cycle.²⁸⁶

Such overcompensation is socially costly. It can severely reduce firms' incentives to innovate and develop new products. Before introducing a new product, a firm must consider the near certainty that there are multiple (unknown) patents that read on the product, the high costs of patent litigation,²⁸⁷ and the likely infringement remedies it will face.

Past Damages—Fortunately, the legal basis to break the vicious cycle already exists. As discussed in subpart III.C above, courts have squarely confronted lock-in in the context of standard-essential patents, and their adjustments have gone a long way toward addressing the issue. These adjustments should extend to *all* cases with an innocent infringer and a willing licensee.²⁸⁸

²⁸⁵ See *supra* section IV.A.1. In an actual ex ante bargain, parties might agree on a negotiated royalty that is discounted to account for the possibility that the patent is invalid or not infringed. In the hypothetical negotiation, by contrast, which is assessed after validity and infringement have been adjudicated and the patent holder has thus borne the risk of losing on those issues, royalties are determined based on the assumption that the patent is valid and infringed and thus should not include any such discount.

²⁸⁶ See *supra* subpart II.B.

²⁸⁷ See, e.g., FED. TRADE COMM'N, *supra* note 3, at 56 & n.27 (citing "normal patent litigation costs" of \$4 to \$5 million per case). Moreover, these costs increase the more successful the projected product turns out to be. Successful products attract patent litigants and, as we have discussed, the "book of wisdom" doctrine allows patent holders to retroactively capture part of the benefit if the product proves unexpectedly successful.

²⁸⁸ The economic rationale for determining reasonable royalty damages by ex ante market value is the same in both cases. Absent some special and explicit policy to the contrary, there is no reason as a general matter to think that SSOs intend by requiring licensing on "reasonable" terms to require SEP holders to license at rates that are lower than those otherwise properly deemed to be "reasonable" for patent law purposes. And there is no reason to think that the statutory provision of "reasonable" royalty damages contemplates royalties that would be unreasonable if charged by an SEP holder. See Jorge L. Contreras & Richard J. Gilbert, *A Unified Framework for RAND and Other Reasonable Royalties*, BERKELEY TECH. L.J. (forthcoming 2015) (manuscript at 28–30) (on file with the Berkeley

This extension is a natural one. In economic terms, the parties are in much the same circumstances in the innocent infringer/willing licensor case as in the standard-essential patent case. In both cases, the infringer faces significant lock-in costs *ex post*, and the patent holder is known or deemed to be willing to grant a license *ex ante* (before the lock-in costs came into play).

Three specific reforms from the standard-essential case law would aid in breaking the vicious cycle if extended to all innocent infringer/willing licensee cases. First, the hypothetical negotiation date should be set just prior to the time that *the infringer* became committed to using the infringing technology, which in most cases will be the lock-in date. In other words, the hypothetical “*ex ante*” negotiation should be assumed to have taken place on that date. As we discussed in section III.A.3 above, design and development cycles may be extensive and may be complicated by numerous external factors, such that a firm may be locked in to a technology before it sells or even designs a product that implements it. Courts acknowledge this in standard-essential patent cases;²⁸⁹ they should do the same in all cases involving innocent infringers and willing licensees.

In the SSO context, courts properly use the earlier date on which *the SSO* included the patented technology in the standard.²⁹⁰ For this, the courts rely primarily on economic and policy considerations, namely that setting the hypothetical negotiation date at just before the patent was declared essential to the standard results in a valuation that reflects the actual benefit offered by the patent and excludes the hold-up value and network effects created by its inclusion in the standard.²⁹¹

Technology Law Journal) (advocating a common approach applicable to both standard-essential and non-standard-essential patents, in which the incremental value of the patent is evaluated prior to investments that are specific to the patented technology).

²⁸⁹ See *supra* note 219 and accompanying text.

²⁹⁰ See *supra* note 218 and accompanying text.

²⁹¹ There is a superficial parallel between the SSO case and the situation in which multiple firms collaborate to create a proprietary standard, such as the Blu-Ray standard. See generally AMENDED & RESTATED BYLAWS OF BLU-RAY DISC ASSOCIATION, <http://www.blu-raydisc.com/Assets/Downloadablefile/BDA%20Bylaws%20V2.3.pdf> [<http://perma.cc/FD2P-F2NR>] (describing the Blu-Ray Disc Association and its aim to broaden the acceptance of Blu-Ray Disc formats). The creation of such a proprietary standard will often increase the amount a technology user would be willing to pay for a license to a patent that is essential to the standard, because the standard would facilitate the commercial exploitation of the patented technology. Arguably, therefore, the technology user should be deemed to be locked-in when the proprietary standard is created, and

Courts also sometimes appear to embrace a contract-like view (i.e., that the FRAND commitment is made as of that date), which reflects those economic and policy considerations and in effect embodies the patent holder's commitment to accept the royalty to which it would have agreed on that date if there had been an ex ante bargain.²⁹²

Second, information from after the hypothetical negotiation date—including under the “book of wisdom” doctrine—should be carefully scrutinized and admitted only to the extent it is probative of what the parties would have done at the time of the hypothetical negotiation.²⁹³ Indeed, the jury should be

the hypothetical negotiation should be deemed to have taken place on that date. We think the better course, however, would be to determine the lock-in date on the basis of actions taken by the infringer, and not third parties, in all cases other than those involving industry-wide standard-setting organizations. Allowing broader consideration of the implications of actions by third parties would create insuperable line-drawing problems and would complicate litigation. Perhaps more important, industry-wide SSOs have enormous economic clout; they purport to represent both technology users and patent holders; and for those reasons they are expected to protect technology users from hold-up by patent holders. The creators of proprietary standards, by contrast, rarely have market power for a new, untested standard and are generally entitled to reap the fruits of their creation through, among other things, the prices they charge to others who want to implement their proprietary standard. See *Standard Setting and Market Power: Hearing on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy Before the FTC & DOJ* 10 (2002) (statement of Richard T. Rapp, President, Nat. Econ. Research Assoc. & Lauren J. Stiroh, Vice President, Nat. Econ. Research Assoc.); Daniel S. Sternberg, *A Brief History of RAND*, 20 B.U. J. SCI. & TECH. L. 211, 244 (2014). The ability of firms that have preexisting power in the relevant market to collaborate on a proprietary standard may be constrained by antitrust law. See Alan Devlin, *Standard Setting and the Failure of Price Competition*, 65 N.Y.U. ANN. SURV. AM. L. 217, 227–32 (2009).

²⁹² See, e.g., *Apple, Inc. v. Motorola, Inc.*, 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012) (Posner, J., sitting by designation). For a critique of the contract, property, and antitrust law bases that courts have employed to explain and enforce various aspects of FRAND commitments, see generally Jorge L. Contreras, *A Market Reliance Theory for FRAND Commitments and Other Patent Pledges*, 2015 UTAH L. REV. 479 (proposing a “market reliance” justification for permitting third parties to enforce a patent holder's FRAND commitments).

²⁹³ See *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1229–31 (Fed. Cir. 2014) (rejecting poststandardization patent valuation in standard-essential patent context); see also Gooding, *supra* note 137, at 1–2 (explaining that courts should use ex post information only for the limited purpose of ascertaining how parties to a hypothetical negotiation would have valued a patent ex ante, and demonstrating that commercial practices of market valuation in other areas similarly limit the use of ex post information). Further, as with standard-essential patents, the royalty should not increase just because the product is surprisingly successful. The infringer bore the risk of failure by investing in the new product and should be permitted to reap the fruits of success.

instructed on lock-in and told to disregard any value arising from it.²⁹⁴

Third, relatedly, the *Georgia-Pacific* factors should be modified in innocent infringer/willing licensor cases. The Federal Circuit has never mandated the use of these factors²⁹⁵ and has expressly required omitting some and modifying others in a standard-essential patent case.²⁹⁶ Its skepticism about those factors should also apply to all innocent infringer/willing licensor cases. In such cases, too, “many of the *Georgia-Pacific* factors simply are not relevant.”²⁹⁷

Some *Georgia-Pacific* factors should be omitted entirely in Category I cases, in particular Factor 8 (“[t]he established profitability of the product made under the patent; its commercial success; and its current popularity”) and Factor 11 (“[t]he extent to which the infringer has made use of the invention; and any evidence probative of the value of that use”).²⁹⁸ These are directed solely at ex post considerations.

Other *Georgia-Pacific* factors should be used only if and to the extent they shed light on what the parties would have known and used in ex ante negotiations. Factor 10 (“[t]he nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention”²⁹⁹) should include only “the nature of the patented invention” and the “commercial embodiment” that the parties would have anticipated ex ante (except to the extent the patent holder can prove that an ex ante license would not have permitted such an em-

²⁹⁴ The Federal Circuit approved this for standard-essential patents in *Ericsson*, 773 F.3d at 1233 (“Because SEP holders should only be compensated for the added benefit of their inventions, the jury must be told to differentiate the added benefit from any value the innovation gains because it has become standard essential.”).

²⁹⁵ *WhitServe, LLC v. Comput. Packages, Inc.*, 694 F.3d 10, 31–32 (Fed. Cir. 2012).

²⁹⁶ See *Ericsson*, 773 F.3d at 1229–31.

²⁹⁷ *Id.* at 1230; see also Durie & Lemley, *supra* note 111, at 636 (arguing that the relevant *Georgia-Pacific* factors fall into “four basic categories: (1) whether the patentee in fact produces a product in the market; (2) the contribution made by the patented technology compared to the next best alternative; (3) the number and importance of other inputs necessary to make that technology work; and (4) evidence of how the market has actually valued the patent, to the extent it differs from the outcome of (1), (2), and (3)”).

²⁹⁸ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970). The Federal Circuit specifically rejected Factor 8 for standard-essential cases, finding the “invention’s ‘current popularity’ . . . is likely inflated because a standard requires the use of the technology.” *Ericsson*, 773 F.3d at 1231. The same is true when lock-in arises from other causes.

²⁹⁹ *Georgia-Pacific*, 318 F. Supp. at 1120.

bodiment by the licensee). The other aspects of Factor 10 relate solely to the infringer's ex post usage, and introduce a significant degree of ex post contamination.³⁰⁰ Factor 13 ("[t]he portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer"³⁰¹) is useful insofar as it instructs the jury to apportion the value of the product on which the royalty is based between its patented and unpatented components. But it mistakenly focuses on the infringer's actual (ex post) profit, rather than its expected (ex ante) profit. It should be modified to focus on the latter. Finally, Factor 6³⁰² should also focus on what the parties expected ex ante rather than on ex post outcomes.

If ex post contamination were reduced in this way, the vicious cycle might well turn virtuous: lower litigation royalties would lead to lower license fees, which in turn would lead to still lower royalties. One would expect the system to converge to an equilibrium in which actual royalties, expected royalties, and license fees all approximate the ex ante value of the patented invention.

Prospective Remedies—No injunction should issue in the innocent infringer/willing licensor case.³⁰³ The patent holder was seeking (or is deemed to have been seeking) royalties rather than exclusivity ex ante. Had it succeeded, it would not later have had the option of an injunction. Giving it an injunction ex post would serve only to enable the patent holder to extract a premium from the infringer based in part on the latter's lock-in costs.³⁰⁴ That would overcompensate the patent holder and reduce other firms' incentives to develop new products.³⁰⁵ It would also harm consumers and other users of the

³⁰⁰ See *Ericsson*, 773 F.3d at 1231 (stating that parts of Factor 10 are inapplicable in standard-essential cases).

³⁰¹ *Georgia-Pacific*, 318 F. Supp. at 1120.

³⁰² *Id.* ("The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or conveyed sales.").

³⁰³ An injunction might be appropriate if the infringer refuses to pay a court-ordered judgment, but an injunction in that case would be a remedy for not complying with the court order, not a remedy for patent infringement.

³⁰⁴ See *supra* notes 152–54 and accompanying text; *supra* section III.D.2.

³⁰⁵ The principal argument for injunctive relief and enhanced damages remedies is that they will facilitate efficient transactions between patent holders and would-be technology users. See, e.g., F. Scott Kieff, *Removing Property from Intellectual Property and (Intended?) Pernicious Impacts on Innovation and Competition*, in *COMPETITION POLICY AND PATENT LAW UNDER UNCERTAINTY* 416, 430 (Geoffrey A.

infringer's products, including those who might be innovating on the basis of those products.

Current injunction law is generally consistent with this proposal. Under *eBay Inc. v. MercExchange, L.L.C.*,³⁰⁶ a truly willing patent holder would rarely be able to establish that it is entitled to an injunction because it would rarely be able to establish either that it is irreparably harmed by the infringement or that money damages are an insufficient remedy.³⁰⁷ Since *eBay*, only 26% of patent cases in which NPEs have prevailed resulted in an injunction (as compared with 79% of cases in which practicing entities have prevailed).³⁰⁸

Current doctrine is more problematic with regard to forward-looking monetary relief. The law of ongoing royalties, for example, systematically overcompensates the patent holder. As we discussed in subpart I.B above, it not only contaminates the royalty calculation with ex post evidence but also provides for an indefensible validity and infringement premium over the reasonable royalty rate.

The royalty rate established by an ex ante hypothetical negotiation is equally appropriate after trial as before.³⁰⁹ Where both parties were willing to enter into an agreement ex ante, it can be presumed that the agreed-upon license would have extended beyond the date of the infringement trial, presumably for the full term of the patent. Trial and the intervening events changed nothing of any relevant economic significance, and validity and infringement were assumed in

Manne & Joshua D. Wright eds., 2011) (noting that a central "problem with liability rules is that they seriously frustrate the ability for the patentee to attract and hold the constructive attention of a potential contracting party while preserving the option to terminate the negotiations"). This argument is inapplicable where circumstances make full preclearance of patent rights infeasible.

³⁰⁶ 547 U.S. 388 (2006).

³⁰⁷ See *supra* notes 44–46 and accompanying text.

³⁰⁸ Chien & Lemley, *supra* note 46, at 10 fig.1. Further, in cases where the injunction an NPE sought was contested, the grant rate was only 7%. See *id.*

³⁰⁹ Arguably, even in the case of an innocent infringer, the royalty might be enhanced if the technology user does not negotiate in good faith after a patent holder plausibly claims that it is infringing a valid patent. See *supra* note 278 and accompanying text. But "good faith" negotiations would depend on numerous factors, including the technology user's subjective view of the likelihood that the asserted patent is valid and infringed, the royalties that the parties would have agreed upon in an ex ante negotiation, and the conduct of the patent holder. Well-counseled firms should be able to avoid a finding of "bad faith," and courts are unlikely to be able to determine bad faith reliably. Adding that issue to already complex patent litigation would complicate matters even more and would be unlikely to induce more efficient conduct.

computing the royalty rate for past infringement.³¹⁰ Thus, forward-looking monetary relief should either be an ongoing royalty at the same rate or else a lump sum equal to the net present value of that royalty rate for the remainder of the patent's term.³¹¹

b. *Category II: Innocent Infringement with an Unwilling Licensor*

Category II involves the less common case where the patent holder would not have been willing, *ex ante*, to license the patent to the (innocent) infringer.

Economic Characteristics—In economic terms, this is a more difficult case. Assuming the patent holder is rational, its unwillingness to license means that it would not have been able to realize expected net gains from a deal allowing the infringer to use the technology. The infringer's use of the patented technology was not efficient. But it happened, the infringer is innocent, and now the infringer is locked in.

Importantly, in this case, this suboptimal outcome is neither side's fault because neither could cost-effectively have avoided it. Rather, high search and transaction costs of avoiding infringement are likely to blame, especially in fields that have a "develop without full preclearance" dynamic.

It follows that, even though this outcome is unfortunate, it would be counterproductive to use remedies law to try to ensure that it never occurs. It cannot be cost-effectively avoided. Remedies law should instead aim to address the situation effectively when it does occur, preserving incentives for inventors and product developers who might find themselves in an innocent infringement/unwilling patent holder situation in the future.

Past Damages—Assuming the patent holder is rational, lost profits may be available in innocent infringer/unwilling licensor cases and would be an appropriate remedy.³¹² Where lost profits are not available, an *ex ante* reasonable royalty is optimal.

³¹⁰ See *supra* notes 229–31 and accompanying text. In the rare case in which the patent holder can prove that it was willing to license for only a limited term and intended *ex ante* not to license thereafter, it should be deemed to be an unwilling licensor with respect to infringement after the expiration of that term.

³¹¹ See, e.g., *Pers. Audio, LLC v. Apple, Inc.*, No. 9:09CV111, 2011 WL 3269330, at *13 (E.D. Tex. July 29, 2011) (entering judgment on jury's verdict that represented lump sum verdict covered all past and present use of the patented technology).

³¹² See *supra* section I.A.1.

A rational patent holder would be willing to forego the revenue from licensing its patent only if it expects to gain even more from keeping the potential infringer out of the market. In other words, an unwilling patent holder is one who expects the benefits of exclusivity (at least against the potential licensee) to be greater than the potential licensing royalty. Most legitimate uses of patent exclusivity arise from sales of products that compete with the infringer's.³¹³ The patent holder may benefit from them directly, if it sells the competing products itself,³¹⁴ or indirectly, if it licenses the patent to one or more entities who sell the competing products and extracts a license premium for keeping the infringer out of the market.

Lost profits are generally available to compensate patent holders for losses that arise from competition by infringing products.³¹⁵ The doctrine is flexible enough to cover both direct and indirect losses. When the patent holder itself loses sales to the infringer's product, it can recover the profit it would have made on those sales;³¹⁶ and when its licensees lose sales, it can recover the royalties it lost as a result.³¹⁷ Licensees who were promised exclusivity can also join the suit and recover any additional profits they lost as a result of the infringement.³¹⁸

Lost profits strike the right balance in innocent infringer/unwilling licensee cases, provided they are tied to the sales lost as a result of the infringer's use of the patented technology as opposed to other factors. They then reflect the value of the patented invention to a patent holder who seeks market exclusivity.³¹⁹

³¹³ See LANDES & POSNER, *supra* note 3, at 320–21 (noting that patents are often sought to prevent others from obtaining a patent that might be used to prevent applicants from using their innovations).

³¹⁴ The patent holder's competing products need not themselves practice the patent. A patent holder might want to exclude others from making infringing products that compete with its own established line of nonpatent practicing products. See, e.g., *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1548–49 (Fed. Cir. 1995) (en banc) (holding that lost profits damages may be awarded with respect to lost sales of nonpatent practicing products "if it is proven that those lost sales were caused in fact by the infringement").

³¹⁵ See *supra* section I.A.1.

³¹⁶ See *supra* section I.A.1.

³¹⁷ *Rite-Hite*, 56 F.3d at 1546 (explaining that reasonably foreseeable lost sales are compensable).

³¹⁸ *Morrow v. Microsoft Corp.*, 499 F.3d 1332, 1340 (Fed. Cir. 2007).

³¹⁹ Traditionally, apportionment has applied in lost profits calculations because patent damages awards were meant to compensate for the lost profits that would have been attributable to the value of the invention. However, since the development of the "but for" test of lost profits, it is not clear that apportionment remains applicable. See generally Eric E. Bensen, *Apportionment of Lost Profits in*

It is true that the evidentiary burden of proving lost profits is a heavy one.³²⁰ But patent holders that have made an affirmative, rational decision not to license will usually be able to prove lost profits. And patent holders who did not make such a decision will be discouraged from later claiming that they did.

Lost profits are based on much the same considerations as the rational decision not to license, although the two determinations are made at different times. Thus, for instance, when determining whether to license its patent, a rational patent holder would evaluate factors much like those specified in *Panduit*: (1) whether it expected there to be demand for the patented product; (2) whether the infringer could compete effectively by using an acceptable noninfringing substitute; (3) whether the patent holder had the manufacturing and marketing capability to exploit the demand; and (4) how much profit it expected to make.³²¹

The difference in when the determinations are made is not significant. It is true that the patent holder's ex ante decision not to license might be proved wrong—i.e., it might turn out that the patent holder has no actual lost profits attributable to the infringement—and that licensing would have been the more profitable ex ante policy. The patent holder suffers no harm from its inability to show lost profits in such a case and in fact might be better off than it would have been had there been no infringement because a reasonable royalty is still available.³²² If the royalty approximately equals the license fee that would have been offered in an ex ante negotiation, it is no less than the patent holder would have obtained if it had actually negotiated.

The high burden of proving lost profits serves a useful screening function. To the extent that an ex ante unwilling patent holder has access to remedies that a willing patent

Contemporary Patent Damages Cases, 10 VA. J.L. & TECH. 1, 13–23 (2005) (reviewing the historical development of apportionment in lost profits cases and concluding that apportionment is still good law, but largely ignored in modern patent cases).

³²⁰ See *supra* section I.A.1. Mark Lemley has argued that courts should draw a sharper distinction between lost profits and reasonable royalty damages and that to make such a divide workable, courts should be “more lenient than they have been in requiring proof of lost profits.” See Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties*, 51 WM. & MARY L. REV. 655, 671–72 (2009).

³²¹ See *supra* section I.A.1 (discussing the *Panduit* factors); cf. *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978).

³²² See 35 U.S.C. § 284 (2012) (providing that damages can “in no event [be] less than a reasonable royalty”).

holder does not—higher damages, for example, or the possibility of an injunction—all patent holders have an incentive to *claim* to have been unwilling. In many cases, there will be no established licensing policy with which to test the claim.³²³ But because the considerations involved in proving lost profits also shed light on the likelihood that the patent holder would have agreed to a license *ex ante*, they serve as a useful screen of unfounded claims that the patent holder was an unwilling licensor.

In the rare cases where the patent holder can establish that it would not have licensed the patent *ex ante*, but not that it suffered damages, it would be entitled to a reasonable royalty.³²⁴ The calculation of the reasonable royalty damages would be slightly different from that described above because, if the patent holder was unwilling, there is no royalty on which the parties would have agreed *ex ante*. One solution would be to deem the reasonable royalty to be the maximum amount that a willing licensee would have agreed to pay *ex ante*, but that solution would award the full value of the patented technology to the patent holder, even though the infringer was innocent. A better solution might therefore be to set the reasonable royalty at an amount that lets the parties share the surplus created by the patented technology.

Georgia-Pacific Factor 4 (“[t]he licensor’s established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly”³²⁵) suggests a basis for increasing the damages to compensate an unwilling licensee for the loss of market exclusivity. Such an increment is appropriate if used sparingly, only in cases where the patent holder has clearly established its *ex ante* unwillingness to license and a likelihood that it was harmed in some unquantifiable way by the infringement and in excess of the reasonable royalty damages, and with sensitivity to the innocence of the infringer. The increased damages should in no event be punitive or so high that the infringer would have anticipated losing money *ex ante* if it had known of the royalty rate at that time.

³²³ In most circumstances, it will be very difficult for a nonpracticing entity to claim that it was an unwilling licensor, particularly if it lacks an established licensing program under which it granted exclusive rights to a single party or otherwise committed to limit its licensees.

³²⁴ *Id.*

³²⁵ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

Prospective Remedies—Prospective remedies in the innocent infringer/unwilling licensor context—especially injunctive relief—pose a difficult problem. On one hand, the patent owner would have sought exclusivity, rather than a license fee, ex ante, and denying an injunction amounts to imposing a compulsory license.³²⁶ On the other hand, as we have discussed, granting an injunction could subject the innocent defendant to very large losses arising from lock-in.³²⁷ The prospect of such losses would severely reduce firms' incentives to develop products, even in a "develop without full preclearance" context.

Because both parties are innocent, the remedy should be designed to create optimal incentives going forward, rather than to punish past conduct or deter similar conduct in the future. We propose a remedy that draws upon a typology introduced by one of us in an article with Guido Calabresi that distinguishes between "property rules" and "liability rules."³²⁸ As articulated there: "An entitlement is protected by a property rule to the extent that someone who wishes to remove the entitlement from its holder must buy it from him in a voluntary transaction in which the value of the entitlement is agreed upon by the seller."³²⁹ And it is protected by a "liability rule" when "someone may destroy the initial entitlement if he is willing to pay an objectively determined value for it."³³⁰ Both the patent holder and the infringer could have an entitlement protected by either a property rule or a liability rule. There are four possibilities:

Rule 1: *Property-rule protection for the patent holder.* The patent holder is entitled to an injunction to prevent the infringer from using the patent, and the infringer could prac-

³²⁶ See *Panduit*, 575 F.2d at 1158 (setting the royalty rate equal to the rate the parties would have negotiated ex ante "would . . . make an election to infringe a handy means for competitors to impose a 'compulsory license' policy upon every patent owner."); FED. TRADE COMM'N, *supra* note 3, at 173 (discussing concerns about imposing such "compulsory licenses"); Cotter, *supra* note 4, at 316 ("[A] reasonable royalty that really *does* reflect what the parties would have agreed to ex ante might leave the defendant no worse off as a result of the infringement (except for attorney's fees—an important qualification—and any other uncompensated costs) and, thus, inhibit the channeling function of patent damages.").

³²⁷ See *supra* subpart II.C and section III.D.2.

³²⁸ Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1092 (1972). Dan Burk has analyzed how this typology could apply to intellectual property remedies. See Dan L. Burk, *Intellectual Property in the Cathedral*, 4 ZEITSCHRIFT FÜR GEISTIGES EIGENTUM/INT. PROP. J. 405, 406–09 (2013) [hereinafter Burk, *Intellectual Property in the Cathedral*]; Dan L. Burk, *Means and Meaning in Patent Remedies*, 92 TEX. L. REV. 13, 18–19 (2013).

³²⁹ Calabresi & Melamed, *supra* note 328, at 1092.

³³⁰ *Id.*

tice the patent only if it convinces the patent holder to permit it to do so.

Rule 2: *Liability-rule protection for the patent holder.* The patent holder cannot prevent an infringer from practicing its patent, but it is entitled to reasonable royalty compensation set by the court.

Rule 3: *Property-rule protection for the infringer.* The infringer has a right to infringe and need not compensate the patent holder for doing so. This rule applies, for instance, if the patent is found invalid, unenforceable or not infringed.

Rule 4: *Liability-rule protection for the infringer.* The patent holder can prevent an infringer from practicing the patent (as in Rule 1), but it must compensate the patent holder for the costs its doing so imposes on the infringer, such as the infringer's cost of switching to a noninfringing alternative.³³¹

In the case of an innocent infringer and an unwilling licensor, we propose a combination of Rule 2 and Rule 4. The patent holder should be offered an injunction, on the condition that it pays all the infringer's costs to switch to a noninfringing alternative (Rule 4).³³² If the patent holder chooses not to take the injunction on these terms, it would still get a reasonable ongoing royalty at the same rate as for past damages (Rule 2); such royalties may be appropriately based on lost profits in cases where such losses are proven.³³³

³³¹ See also Burk, *Intellectual Property in the Cathedral*, *supra* note 328, at 413 (noting that this list could be expanded to include Rule 5 and Rule 6 "put" options allocated to either the infringer or the patent holder; in the first case, the infringer would be permitted to continue infringing but could elect to stop infringing at a later date and receive damages, and in the second case, the patent holder would be awarded an injunction but could elect to waive the injunction at a later date and receive damages).

³³² In some circumstances, it might be appropriate to grant an injunction but stay the injunction for a limited period of time to permit design-around. A stay has the advantage of minimizing disruption and thus might be an efficient solution in circumstances where the infringer can design-around promptly but an injunction is otherwise appropriate. But the prospect of staying an injunction does not make the injunction remedy appropriate where it would not otherwise be because a stay does not solve the hold-up problem when, as is usually the case, design-around costs exceed the ex ante value of the patent. See Lemley & Melamed, *supra* note 9, at 2175 n.232 (discussing the possibility of staying injunctive relief to permit design-around, explaining that "[w]hether this will work depends on the ease of finding an alternative (which is properly related to the value of the patent) and the ease of switching to that alternative after the fact (which is not). Where implementing an alternative is difficult or very costly, even temporarily staying the injunction will not avoid the leverage the injunction or threat thereof gives to the patent holder to negotiate a royalty in excess of the ex ante value of the patent"); see also Lemley & Shapiro, *supra* note 4, at 2037-38 (proposing guidelines for injunction delay).

³³³ Both Rule 2 and Rule 4 are liability rules. Mark Lemley and Phil Weiser have argued that liability rules are appropriate for patents, but for the different

This combination would have the patent holder internalize both the benefits and the costs of an injunction and would give it an incentive to make the socially efficient choice.³³⁴ If the infringer's costs to switch are less than the value to the patent holder of market exclusivity, the patent holder will choose the injunction; if the reverse is true, it will choose the royalty.³³⁵

One can imagine the alternative of giving *the infringer* the choice between Rule 2 and Rule 4. But, in contrast to our proposed remedy, the infringer would not necessarily have an incentive to make the most efficient choice. The infringer might choose Rule 4, even if the costs to switch are greater than the royalty and the patent holder's lost profits, because that alternative would be costless to it; the infringer would then both avoid paying future royalties and be able to switch at the patent holder's expense.

The proposed remedy would preserve technology users' incentive to develop new products. They will know that they will not lose their entire investment through innocent infringement. And the proposed remedy would largely preserve inventors' incentives to innovate and disseminate their inventions. They will know they can get exclusivity going forward if doing so is efficient and that they are guaranteed at least a reasonable royalty. Moreover, since the royalty may include a "kicker" based on *Georgia-Pacific* Factor 4 (the patent holder's policy of licensing or not licensing the patent),³³⁶ patent holders are

reason that it is commonly too difficult to fashion injunctions that exclude only the infringing technology and not other product components as well. Mark A. Lemley & Philip J. Weiser, *Should Property Rules or Liability Rules Govern Information?*, 85 TEX. L. REV 783, 784–85 (2007).

³³⁴ This is one of those situations in which liability rules are more effective than property rules in dealing with the problem of undisclosed private valuation information and are thus more likely to lead to an efficient outcome. See generally Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade*, 104 YALE L.J. 1027, 1038–39 (1995) (explaining that an entitlement holder in a liability regime may reveal how it values the entitlement by seeking to "(1) 'bribe' a potential taker not to take the entitlement; or (2) 'sell' its entitlement at a price less than the liability rule damage amount").

³³⁵ It might be thought that, because both parties are innocent, they should split the switching costs. But the patent holder internalizes all the benefits of an injunction. If it would internalize only half the switching costs, it would have an incentive to choose the injunction even if the total costs of the injunction exceeded its benefits. Indeed, a patent holder would take the injunction even if it was worth less than half the switching costs because it would then ordinarily have the option of selling to the infringer relief from the injunction (thus enabling the infringer to switch and relieving the patent holder of any obligation to pay any switching costs).

³³⁶ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

generally compensated at least to some extent for their loss of market exclusivity.³³⁷

Courts have the ability to implement such a remedy under existing law, stemming from their authority to place conditions on injunctions in the interest of equity, including, in appropriate cases, the authority to condition an injunction on the plaintiff making a payment to the defendant.³³⁸

2. *Guilty Infringement*

We now turn to cases of guilty infringement—instances in which the infringer could have cost-effectively learned of and negotiated for a license to the infringed patent, but did not do so. This occurs most frequently in disputes between competitors.

Guilty infringement, unlike the innocent infringement we have discussed so far, implicates an additional incentive, namely, the incentive to negotiate *ex ante*. Where *ex ante* negotiation between the parties is practical, it is better than *ex post* resolution of infringement by the courts for a variety of reasons. First, the costs of negotiating *ex ante* are usually much lower than the costs of litigating infringement.³³⁹ Second, *ex ante* negotiation substantially increases the likelihood that the parties will make economically efficient choices—that is, either the parties will agree to a license or the potential infringer will choose an alternative rather than accept a license at the patent holder's lowest offer.³⁴⁰ Third, it is more efficient for the parties

³³⁷ See, e.g., *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554–55, 1554 n.13 (Fed. Cir. 1995) (en banc) (finding that the district court's reasonable royalty determination was justified in part by the fact that "that Rite-Hite had consistently followed a policy of exploiting its own patents, rather than licensing to competitors").

³³⁸ See, e.g., *Spur Indus., Inc. v. Del E. Webb Dev. Co.*, 494 P.2d 700, 708 (Ariz. 1972) (granting an injunction to real estate developer against a cattle feeding operation that had become a nuisance, but requiring the real estate developer to indemnify the cattle feeding operation for a reasonable amount of the cost of moving or shutting down); *Pac. Hills Homeowners Ass'n v. Prun.*, 73 Cal. Rptr. 3d 653, 660 (Cal. Ct. App. 2008) (holding that the trial court did not abuse its discretion, in enjoining homeowners to move or shorten fence and gate to comply with homeowners' association's height and setback restriction, by requiring association to pay two-thirds of the cost of moving fence).

³³⁹ See *supra* notes 152–53 and accompanying text (discussing the high cost of patent litigation).

³⁴⁰ Blair & Cotter, *supra* note 257, at 59 ("Presumably, the patent owner would have agreed [ex ante] to a royalty equal to no less than the profit she could have expected to earn from manufacturing the invention herself; the infringer would have agreed to a royalty equal to no more than the amount he could have expected to earn from using a non-infringing alternative.").

to negotiate a price ex ante than for a court to attempt to determine, ex post, the price that they would have reached.³⁴¹

Remedies in the guilty infringement case, therefore, should also be designed to encourage firms that can cost-effectively negotiate ex ante to do so instead of infringing. This in turn means that guilty infringers should pay a penalty beyond the ex ante value of the patented invention for infringing without first negotiating.³⁴² A firm would have no incentive to negotiate for a license ex ante, instead of infringing, if it were confident that the penalty for infringement was no more than the price it would pay for a license. Such an infringer might rationally choose not to negotiate ex ante because the patent holder might never discover the infringement and might not sue if it did.

a. Category III: Guilty Infringement with a Willing Licensor

Economic Characteristics—As discussed above, to promote ex ante negotiations in this scenario, a guilty infringer should be required to pay more than an innocent infringer—i.e., more than a reasonable royalty—whether or not the patent holder would have been willing to license the patent ex ante.

Past Damages—The base level of compensation should be a reasonable royalty that reflects either the patent holder's lost profits or, if the patent holder cannot prove lost profits, the ex ante value of the patented invention. To encourage ex ante negotiation in these circumstances, however, the patent holder should receive enhanced damages. The maximum amount of enhancement needed for deterrence is that which, combined with the compensatory damages, would equal the infringer's past and expected future benefit from the infringement (relative to the next-best alternative), increased to take into account the ex ante likelihood that the infringer would have avoided paying

³⁴¹ See *id.* at 48 (“[It is advantageous to] encourage would-be users of the patented invention to negotiate with the patent owner, the theory being that the outcome of these private negotiations is likely to result in a license fee that more accurately reflects the value of the invention than would a compulsory-licensing fee set by the government.”).

³⁴² See generally GUIDO CALABRESI, *THE FUTURE OF LAW AND ECONOMICS* (Yale, forthcoming 2015) (ch. 6) (on file with authors) (arguing that tort and other compensatory remedies might be increased to take into account public interests beyond those of the parties to the legal dispute); Guido Calabresi, *A Broader View of the Cathedral: The Significance of the Liability Rule, Correcting a Misapprehension*, 77 L. & CONTEMP. PROBS. 1, 6–7 (2014) (arguing the same).

appropriate compensation for its use of the infringing technology.³⁴³

Existing willfulness law permits enhanced royalties for some guilty infringers, but not all, because it focuses on the infringer's knowledge of or intent to infringe the patent-in-suit. The inquiry contemplated here, by contrast, would focus on the reasonableness of the infringer's failure to negotiate a license *ex ante* in light of his or her assessment of the strength of the infringement claim, the number of patents and patent holders implicated by his or her product, and the cost of negotiating a license *ex ante*.

Guilty infringement should be evaluated only as of the hypothetical negotiation date (and not—as with willfulness—at any time after infringement has begun). That is the time at which the willing licensor would have agreed to a royalty, and the infringer will have incurred lock-in costs after that date.³⁴⁴ Firms should be neither required to negotiate for a license after they are already locked in nor penalized for not doing so. That would force them to pay a lock-in premium that would reduce firms' incentive to develop new products.³⁴⁵

Prospective Relief—Although a closer question than when the infringer is innocent, on balance no injunction should issue in these cases. The guilty infringer should be penalized only by enhanced damages for past infringement.

First, while one would expect a guilty infringer and a willing licensor to bargain around the injunction, there is always the possibility that negotiations will fail for some reason. If they do—meaning that the injunction goes into effect—the result is a net loss for society as a whole. Removing the infringing product from the market will usually impose costs on innocent third parties, such as the infringer's suppliers and customers, which have reasonably relied on the availability of the product.³⁴⁶ In addition, any money or effort the infringer spends to switch to a new product is a social loss that creates little or no countervailing benefit.

³⁴³ See generally, e.g., Gary Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169 (1968).

³⁴⁴ See *supra* subpart II.C.

³⁴⁵ See Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law's Willfulness Game*, 18 BERKELEY TECH. L.J. 1085, 1088 (2003) (proposing that willfulness should be evaluated as of the date the infringer adopted the infringing technology rather than on an ongoing basis).

³⁴⁶ See, e.g., *z4 Techs., Inc. v. Microsoft Corp.*, 434 F. Supp. 2d 437, 443 (E.D. Tex. 2006) (denying a permanent injunction in part because of its potential negative effect on consumers who used defendant's product).

Second, if the parties do manage to contract around the injunction, it adds little value. The patent holder gets an unexpected windfall: the lock-in premium it can extract. But this premium, being unpredictable and dependent on misconduct by the infringer, adds little to other inventors' incentive to invent or patent.

Third, enhanced damages are a more flexible way to incentivize guilty infringers to negotiate *ex ante*. Injunctions are binary: either the infringing product is enjoined (subject to potential design-around) or it is not. There is a limit to how closely injunctions can be tailored to the nature and extent of the infringer's guilt. Enhanced damages, by contrast, can be set to a level that reflects the particular circumstances.³⁴⁷

Current injunction law would probably reach the same result. Although the guilt of the infringer might tilt the balance of the equities factor in favor of the patent holder, a patent holder that is a willing licensee is not irreparably harmed by being denied an injunction, and money damages are sufficient to compensate it.³⁴⁸

That leaves the question of the appropriate forward-looking monetary relief in guilty infringer/willing licensor cases. Forward-looking damages should be used only to compensate the patent holder. The compensatory purpose is accomplished by an ongoing royalty calculated the same way as the compensatory (i.e., without enhancement) royalty for past damages (or the equivalent lump sum royalty), just as in the innocent infringement case.³⁴⁹

Unlike past damages, forward-looking damages should not be used to penalize the infringer for not having negotiated *ex ante*. Any such penalty can be included in enhanced damages for past infringement. Enhancing royalties for ongoing infringement is thus not necessary for deterrent purposes and would inefficiently increase the marginal cost of, and thus reduce, both the commercialization of the patented technology and follow-on innovation.³⁵⁰

³⁴⁷ See, e.g., Cotter, *supra* note 4, at 327 (discussing various factors that might affect enhanced damages, albeit not within the existing willfulness law).

³⁴⁸ See *z4 Techs.*, 434 F. Supp. 2d at 444 (denying nonpracticing entity's request for permanent injunction against willful infringer); *supra* section I.B.1.

³⁴⁹ See *supra* subsection IV.B.1.a.

³⁵⁰ See Erik Hovenkamp, *On the Law and Economics of Ongoing Patent Remedies* (on file with authors).

b. *Category IV: Guilty Infringement with an Unwilling Licensor*

Economic Characteristics—The final category, where the infringer is guilty and the patent holder would not have been willing to license *ex ante*, calls for the severest remedies. This case often arises between two competitors. The patent holder's unwillingness to license means that the infringer's use of the patented technology was not efficient and should never have begun.³⁵¹ But this time, the suboptimal outcome is the infringer's fault; it could have cost-effectively avoided the outcome by negotiating up front, thereby learning that no deal could be reached.

Remedies in these cases should be enhanced beyond the reasonable royalty rate for two reasons: to penalize the infringer for not negotiating *ex ante* (and thus incentivize future infringers to do so) and to compensate the patent holder for the loss of market exclusivity caused by the infringer.

Past Damages—The compensatory aspect of past damages is similar to Category II cases (innocent infringer/unwilling licensor). As there, lost profits will usually be available; and if not, the patent holder should get a reasonable royalty. In this case, unlike Category II, because the infringer is guilty, the royalty should be equal to the maximum amount to which a willing licensee would have agreed *ex ante*. As in Category II, that amount may, in appropriate cases, include a moderate "kicker" pursuant to *Georgia-Pacific* Factor 4 to compensate the patent holder for its loss of market exclusivity.³⁵²

In addition, damages should be enhanced to punish the guilty infringer. The adjusted version of willfulness described above with respect to Category III (guilty infringer/willing licensor) is equally applicable in this case.

Prospective Remedies—An injunction should usually be appropriate, unless the public interest requires otherwise.³⁵³ Unlike cases where the infringement was innocent, the infringer here should not have deprived the patent holder of the market exclusivity it sought. Therefore, it is appropriate to have the infringer bear the costs that arise from restoring that exclusivity—namely, the cost of switching to a different technology.

³⁵¹ See *supra* subsection IV.B.1.b.

³⁵² *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

³⁵³ See *supra* note 46 and accompanying text.

It is possible, of course, that circumstances will have changed since the *ex ante* period and actually excluding the infringer is no longer the best outcome for the patent holder. The patent holder might nevertheless seek an injunction in order to extract even higher royalties from the infringer. An injunction should not be available in that case. The excessive royalty would impose a tax on customers of the infringer that could harm the public and needlessly distort competition between the infringer and its competitors. And precluding bargaining chip injunctions ensures that the patent holder will seek an injunction only if excluding the infringer is efficient.³⁵⁴

For forward-looking monetary relief in the instances in which an injunction is not appropriate, the same analysis as in Category III (guilty infringer/willing licensor) applies.³⁵⁵ The compensatory purpose of such relief can be accomplished by an ongoing royalty or the equivalent lump sum royalty; as with Category II, such royalties may be appropriately based on lost profits in cases where such losses are proven.

CONCLUSION

Current patent infringement remedies do not adequately further the key incentives of the patent system: patentees' incentive to invent, firms' incentive to innovate and develop new products, and the incentive for patent holders and firms to negotiate patent licenses *ex ante*. The law is implicitly based on a "paradigmatic story" of patent infringement in which *ex ante* license negotiations are assumed to be economically feasible. That story is not generally applicable, particularly in "develop without full preclearance" fields like IT where a profusion of overlapping and unclear patent rights makes full patent preclearance so costly that in most cases it is neither economically feasible nor socially desirable.

Current doctrine permits *ex post* considerations to contaminate the hypothetical *ex ante* negotiation on which damages are supposed to be based. The resulting reasonable royalty damages are based in part on the infringers' investment

³⁵⁴ A requirement that the injunction may not be used as a bargaining chip to obtain higher royalties could be enforced in a variety of ways. For example, the court might invite the infringer to move to vacate the injunction if the patent holder or a successor endeavors to license the patent to it, or might prohibit the patent holder from licensing the patent to the infringer for the term of the injunction.

³⁵⁵ See *supra* subsection IV.B.2.a.

in the infringing technology (i.e., its lock-in costs) rather than just on the value of the invention itself.

The result is a vicious cycle that perpetuates excessive royalty rates: lock-in premiums inflate damages awards; these awards, together with the threat of an injunction or exclusion order, increase royalties in *ex post* licenses negotiated in the shadow of litigation; and these increased royalties, in turn, drive future damages awards because negotiated license rates are a key factor in computing a reasonable royalty.

We have proposed a number of ways to break this vicious cycle. Damages law should be sensitive to two key factors. The first factor is whether the infringer is “guilty” or “innocent”—i.e., whether it could have cost effectively discovered the patent, identified the infringement, and negotiated for a license *ex ante*. The law should not try to make innocent infringers negotiate for patent licenses *ex ante* or punish them if they do not do so; such negotiation is not cost effective and requiring it would unduly reduce firms’ incentives to innovate and develop new products and processes.

By contrast, guilty infringers, who can effectively negotiate *ex ante*, should be incentivized to do so and should be penalized if they do not. Damages awards in cases involving them should exceed the invention’s *ex ante* value in most cases.

The second key factor is the infringer’s *ex ante* willingness or unwillingness to license the patent. An *ex ante* willing licensor is adequately compensated by the strictly *ex ante* reasonable royalty that would have resulted from *ex ante* negotiations. However, an *ex ante* unwilling licensor might not be adequately compensated by such a royalty. Unwilling licensors should recover lost profits where they can be proven, and they will sometimes receive enhanced damages awarded to punish and thus deter guilty infringement. Unwilling licensors generally should also be entitled to an injunction to prevent future infringement. In cases of innocent infringement, however, the patent holder should be required either to pay the infringer’s cost to switch to a noninfringing alternative or to forego the injunction and receive an ongoing royalty at the same rate as past damages.